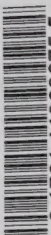


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# REPORT BY THE MAJOR PROJECTS TASK FORCE ON MAJOR CAPITAL PROJECTS IN CANADA TO THE YEAR 2000

JUNE 1981

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June 23, 1981

The Honourable Herb E. Gray  
Minister, Industry, Trade & Commerce  
Government of Canada,  
and  
Chairman, Federal/Provincial Ministers of Industry  
Conference  
Ottawa, Canada

Dear Mr. Gray:

This report of the Major Projects Task Force is delivered in response to the request originating from the Federal/Provincial Conference of Ministers of Industry in November of 1978 and addressed jointly to labour and industry representatives involved in major projects in Canada.

Considerable time has been spent on the review and analysis of the history of major projects in Canada and the formulation of recommendations to increase the benefits from such activity in the future. The work involved special care to ensure that messages available from past experience were analyzed both clearly and fairly.

As to the past, it will be apparent to the reader that major projects in Canada have not done what they could have done in respect to optimizing employment of Canadians, upgrading the skills of Canadian trades and professional personnel, developing Canadian manufacturing and service industries, and other improvements vital to the national capacity to competitively produce high value equipment and services for domestic and export trade.

As to the future, Task Force members have made recommendations which should lead to increased Canadian benefits in these areas. The labour and business members of the Task Force have also indicated within the implementation recommendation their readiness to work together constructively to achieve such objectives. This outcome required developing consensus among business and labour members with widely varying points of view.

The report is presented on behalf of the Task Force membership with considerable respect for the size of the assignment originally given and also with enthusiasm for the mutually beneficial exchange of information and attitudes which has already occurred in producing this document. We are now counting on the report being received positively and constructively by the Government of Canada and, equally important, by the governments of all the provinces.

One particular message in the report is that all provinces are beneficiaries of major project activity in Canada through the supply of materials, goods, services and labour.

This report represents, in the fullest sense, the joint work and recommendations of the Task Force. We are pleased to sign this transmittal as co-chairpersons on behalf of the wide representation of labour and business in Canada who have constituted the Task Force membership.

Yours truly

*Shirley G.E. Carr* *Robert Blair*

Shirley G.E. Carr  
Executive Vice President  
Canadian Labour Congress  
Ottawa, Ontario

Yours truly

S. Robert Blair  
President and  
Chief Executive Officer  
NOVA, AN ALBERTA  
CORPORATION  
Calgary, Alberta

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Government of Quebec

Honourable Barry R. Clark  
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Government of Nova Scotia

Honourable Norman Vickar  
Minister of Industry and Commerce  
Government of Saskatchewan

Honourable Neil Windsor  
Minister of Industrial Development  
Government of Newfoundland



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# MAJOR CANADIAN PROJECTS MAJOR CANADIAN OPPORTUNITIES

A REPORT  
BY THE  
CONSULTATIVE  
TASK FORCE  
ON INDUSTRIAL  
AND REGIONAL  
BENEFITS  
FROM MAJOR  
CANADIAN  
PROJECTS

This report has been prepared by the Consultative Task Force on Industrial and Regional Benefits from Major Canadian Projects, generally referred to as the Major Projects Task Force, and represents the culmination of over two years of effort by this bipartite business-labour body. Although established under the auspices of the federal Minister of Industry, Trade and Commerce after discussions with the provincial ministers of industry, the Task Force has carried out its work independently.

The report discusses the nature and extent of the potential Canadian industrial and regional benefits which could arise from major capital projects to be constructed in this country to the end of the century. Recommendations have been included which the Task Force believes will help to maximize the flow of these benefits to Canadians.



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		Finance			



Significant benefits are expected to accrue to the provinces of Newfoundland, Nova Scotia, New Brunswick and Prince Edward Island as a result of east coast offshore hydrocarbon exploration and development programs.



## Canadian-Owned Company:

A firm operating in Canada which has a majority of its shares beneficially owned by Canadians and control of the firm exercised by Canadians, which makes a significant contribution to Canadian industrial benefits, and which has most of the following characteristics:

- (a) it has a permanent Canadian presence;
- (b) it has a Canadian head office;
- (c) most of its management personnel are Canadian;
- (d) most of its employees are Canadian;
- (e) the majority of its Board of Directors are Canadian; and
- (f) it enjoys a substantial degree of autonomy with regard to key corporate functions, including the mandate to carry out research and development and the freedom to compete in export markets.

## Canadian-Based Company:

A firm operating in Canada which makes a significant contribution to Canadian industrial benefits and which has most of the following characteristics:

- (a) it has a permanent Canadian presence;
- (b) it has a Canadian head office;
- (c) most of its management personnel are Canadian;
- (d) most of its employees are Canadian;
- (e) the majority of its Board of Directors are Canadian; and
- (f) it enjoys a substantial degree of autonomy with regard to key corporate functions, including the mandate to carry out research and development and the freedom to compete in export markets.

When used in a broad sense, the term "Canadian-based company" should not be interpreted to exclude Canadian-owned company.

## Major Projects in Canada Comprise:

- (i) each individual new investment for future production of goods or services which, either through the size of the initial capital investment or through some anticipated major effect on employment, technology, etc., will have a significant impact on the Canadian economy; and
- (ii) programs of equipment procurement, installation or replacement, such as in transportation, communications, and military procurement, which will require significant capital investment.

Not to be included as "major" new projects are those other projects or programs which will require only the continuation of industrial or employment supply patterns already established as Canadian by 1979.

## Industrial and Regional Benefits:

Recognizable developments, resulting from the conduct of major projects, which have the capacity for significant contribution to the Canadian employment, technological and industrial base.

## Summary of Inventory of Major Projects To The Year 2000

(millions of dollars)\*

SECTOR	% OF TOTAL EXPEN	TOTAL	MULTI PROVINCIAL OR UNDETERMINED	ATLANTIC	QUEBEC	ONTARIO	MANITOBA	SASK.	ALBERTA	B.C.	YUKON/ NWT
Conventional Hydro- carbon Exploration & Development	17.8	78 150	2 500	11 500					700	250	65 200
Heavy Oil Development	9.7	42 735						1 750	40 985		
Pipelines	7.2	31 640	27 000	1 185						890	2 175
Processing & Petrochemicals	6.5	28 505		500	3 100	985		1 300	12 205	10 415	
Electrical Gen & Trans	15.3	198 855	620	29 870	66 335	38 435	10 375	3 160	20 250	29 710	100
Forest Products	1.8	7 710		310	1 210	1 665			1 200	3 325	
Mining	4.5	19 935		1 010		4 100	500	3 965	3 230	5 625	1 505
Primary Metals Prod	1.4	6 235		1 025	1 300	1 410	500			2 000	
Transportation	1.4	6 355		420	2 315	450			955	1 885	330
Manufacturing	3.1	13 380	8 575	400	175	4 080			150		
Defence	1.2	5 105	4 825	280							
TOTAL		438 605	43 610	46 500	74 435	51 125	11 375	10 175	79 675	54 100	67 610
% OF TOTAL EXPENDITURES			9.9	10.6	17.0	11.7	2.6	2.3	18.2	12.3	15.4

### \*NOTE:

Because of the wide variation of information sources, the project cost estimates included in the inventory are not stated on a consistent basis throughout. It is understood that most of the estimates are escalated to the year of expenditure by taking expected inflation rates into account. In some cases, however, other dollar bases have been utilized.

## Introduction

This report is the result of more than two years of autonomous, bipartite effort by approximately 80 senior-level members from business and labour organizations across Canada. The Major Projects Task Force has reviewed major projects proposed in Canada to the year 2000 with a view to recommending policies which will maximize industrial and regional benefits to Canada.

This document represents an unprecedented exercise in business/labour consultation in Canada and reflects the consensus view of the participants. Although consensus was reached on a broad range of issues, differences remain — for example, with respect to the role of multinational enterprises and governments in the economy. Since the Major Projects Task Force was originally established under the auspices of government, it is expected that government response will be expeditious and meaningful.

## Approach

The Task Force considered as a "major project" each specific new investment which, through the size of the initial capital-investment or through some anticipated major effect, is expected to have a significant impact on the Canadian economy. To simplify the analysis, an inventory of projects with a capital cost of \$100 million or more was developed. The inventory was translated into demands for goods and services and the relative capabilities of the Canadian supply community were reviewed. Opportunities for expanding Canadian involvement were identified and constraining factors analyzed as a basis for developing recommendations.

## Potential Benefits to Canada from Major Projects

A report such as this naturally considers the aspirations of Canadians, viewed in the broad context

of: long-term, satisfying job opportunities; the development and use of technology; increased industrial capacity; growth and utilization of Canadian services such as project management, engineering, procurement and construction (MEPC); and financial capability. Legislative and regulatory approaches which facilitate participation and control by Canadians throughout all regions of the country are considered.

## Background on Major Project Development in Canada

The Task Force developed a background assessment of the national and international context in which major Canadian projects are being considered and an historical perspective of the role and treatment of major projects in Canada. International trade flows and the need for foreign capital are identified as significant factors which have in the past and continue to influence Canada's economic performance. Investment patterns now and in the foreseeable future, both in Canada and abroad, are being directed to the supply and efficient utilization of energy and other strategic materials. With the prospect of unprecedented activity for many years into the future, the need to seriously consider how to set in place an industrial benefits strategy appropriate to the times ahead has been recognized.

Certain characteristics of major projects make them particularly amenable vehicles for increasing Canadian industrial and regional benefits:

1. Major projects are identifiable, distinct entities, thus facilitating analyses which focus on concrete problems and practical solutions.
2. Major projects are of such a size and have such potential impact, both individually and in aggregate, that opportunities exist to make significant long-term improvements in the industrial structure by influencing the way in which projects are carried out.

3. Major Canadian projects proposed for implementation over the period to the year 2000 are well distributed in impact throughout many major industrial sectors. It is particularly significant that a number of these projects involve developing sources of raw materials, which in themselves provide opportunities for generating additional economic activity through further product upgrading. This, in turn, could result in closer integration between the Canadian resource and manufacturing industries.

4. The impacts of the major Canadian projects proposed for implementation over the period to the year 2000 will be distributed throughout all regions of Canada. These projects can thus provide opportunities for building stronger regions as well as a stronger country.

5. Major projects are highly visible to the public, and the key participants in project planning and execution are therefore likely to be subject to more than usual pressure to perform in ways which are in the best interests of Canada.

6. The nature and significance of major projects are such that government influence and/or participation are markedly higher than is the case in other industrial activities.

## Inventory of Major Projects to the Year 2000

Macro-economic estimates of capital spending in Canada to the year 2000 range to well in excess of \$1 trillion. The Major Projects Task Force has not prepared the same kind of forecast of Canadian major project activity. Instead, a project-specific inventory of currently identified projects has been developed. Projects with a total estimated value of approximately \$440 billion have been identified, spread right across Canada. Close to 90% of this amount is for energy production and distribution and hydrocarbon processing. The table opposite summarizes the sectoral and regional distribution of the inventory.

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## Opportunities and Constraints Associated with Major Projects

Given the anticipated level of potential major project activity, the Task Force considered, "How can Canada best achieve the maximum level of benefits from the work to be carried out?" It soon became clear that substantial gaps existed in both the quality and consistency of the information surrounding major projects. In order to proceed, the Task Force relied on the informed opinion of its members supplemented by analysis of available background materials. Availability of reliable data is absolutely essential if future opportunities are to be identified and realized.

### *Employment and Manpower*

Direct and indirect labour demands from major projects can reduce unemployment, provide more satisfying jobs, and increase participation by Canadians. However, Canadian education and training systems have historically failed to equip adequate numbers of Canadians with skills which suit job market needs. Where skilled labour pools do exist, they are often remote from demands. Canada has traditionally avoided the need to train by encouraging immigration to counteract shortages; however, this will not be an acceptable solution to Canada's manpower shortages in the future. Canada's education and training system requires modifications to ensure the development and delivery of Canadian trades, labour and technical personnel with the necessary skills to support the development, construction and operation of major projects.

### *Technology*

Technologies are highly intertwined so that developments in one area often lead to applications in others. Major projects are often at the leading edge of technology and will result in demands in many areas. These include process, materials, equipment, management, design and construction, manufacturing and electronic system technologies. Canada will have to make conscious efforts to enhance or even just maintain its competitive position in the world.

### *Industrial Base — Manufacturing*

Canadian manufacturers have operated in markets which have traditionally been both small and diverse. Export markets are easier to penetrate with raw materials or semi-finished goods than with manufactured products. Canadian manufacturers compete internationally with firms which receive financial assistance for their exports and protected markets at home. Canadian manufacturers, to some extent as a result of these factors, are faced with short production runs and diverse product lines primarily directed toward domestic markets. Major projects are large consumers of manufactured goods and therefore present a unique and valuable market opportunity for Canadian manufacturers — an opportunity to service a "world-scale" market which should provide relative stability for at least an intermediate-term planning cycle. Assuming Canadian companies invest in the necessary facilities and technology and develop the capability to service these markets with generally competitive manufactured goods, the potential exists to penetrate export markets outside the traditional range of semi-finished or low value-added goods.

### *Industrial Base — MEPC Capability*

Canadian major project demands for MEPC services will potentially be very large over the next two decades. Personnel with the necessary technical education, training, maturity and applicable experience are now and will likely continue to be in short supply worldwide. This situation is aggravated in Canada where there is inadequate capacity to develop such skills in the numbers likely to be required. This factor, when coupled with the historical relationship which Canadian subsidiaries of foreign-based firms have developed with foreign entities, makes it hard for Canadian-owned firms to gain access to the technology and experience necessary to undertake major projects.

Greater emphasis should be placed on providing opportunities for Canadian firms to acquire the

technology and experience required to undertake major projects.

### *Finance*

Members of the Task Force concur in their opinion that the ability to finance major projects and related investments is not a major problem. There is, however, a substantial difference in opinion regarding the conditions under which investment should take place. Labour representatives strongly support an expanded role for government while business favours private sector involvement.

## Task Force Findings and Recommendations

The Task Force has considered a multitude of interrelated factors in developing approximately 50 recommendations. Together, they address the structural and other factors constraining the realization of benefits to Canada from major projects. In summary, the Task Force recommends:

- formation of a "Major Projects Assessment Agency" comprised of business and labour representatives with governments participating as observers.
- provision of continuously updated information regarding major projects since this is seen to be critical to the objective of maximizing industrial and regional benefits.
- a clear statement by governments and project participants of policies and procedures to be followed to expand Canadian ownership and participation, encourage regional equity and streamline regulatory and administrative practice.
- specific actions to improve training and utilization of manpower.
- support of good labour practices through recognition of the right of employees to organize and bargain collectively.

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- high priority efforts to develop technology while limiting any disruptive effects, particularly on workers and communities.

- assistance to facilitate development of Canadian manufacturing and service capability.

## Implementation of Recommendations

The proposed Major Projects Assessment Agency is structured to recognize the jurisdictions of the federal and provincial governments and the competitive proprietary nature of project information, while still providing governments, business, labour and other interested parties the opportunity to freely access consolidated information.

The Agency will address Canadian industrial and regional benefits in the context of major projects which have substantial impacts and will provide advice and recommendations on such matters to Canada's governments and to business and labour. A major objective of the Agency will be to develop and maintain a high quality data base including an inventory of major Canadian projects, their demand requirements, Canadian supply capabilities and major project impacts and opportunities.

Agency autonomy will be assured by its make-up. Formal participation will be limited to senior business and labour representatives. Federal and provincial governments will be represented at the ministerial level as non-voting Associate Members. The Agency will be managed by an Executive Director supported by the necessary staff. Public funding is proposed with both federal and provincial governments participating. The Task Force views the Agency as a new avenue for communication between governments, business and labour and acknowledges that it will have to seek such authority as is necessary to fulfill its mandate.

## Conclusion

This report is a significant achievement in the business/labour consultative process in Canada. Individuals from a large number of business and

labour organizations have given freely of their time and effort in a very significant way in order to present an independent consensus viewpoint.

Major projects planned in Canada during the next two decades provide major opportunities for diverse sectors of the Canadian economy and for all geographic areas of the country. The projects provide the basis for developing new Canadian capabilities which can fill the needs of the projects and then be applied to wider markets with consequent additional benefits.

The Task Force is strongly committed to taking such steps as may be necessary to carry out the intent of its recommendations, and expects vigorous support from governments. At the outset, expeditious efforts by governments should be made to commit the modest funds necessary to implement the recommendations of the Task Force.



Quebec's skilled labour force will be involved in the manufacture of equipment required in association with anticipated strong growth in the urban transport sector



## Origins

The Consultative Task Force on Industrial and Regional Benefits from Major Canadian Projects, generally referred to as the Major Projects Task Force, was established in December 1978 under the auspices of the federal Minister of Industry, Trade and Commerce (IT&C) following discussions with the provincial ministers of industry. It took the form of a bipartite body of approximately 80 senior-level members, providing equal representation from labour and business organizations across Canada. In addition, throughout the exercise representatives from nine Canadian provinces participated as observers, and IT&C's Construction and Consulting Services Branch provided secretariat services. A list of the Task Force members, staff and observers is included as Appendix A.

## The Task Defined

The impetus for the formation of the Major Projects Task Force was a shared perception and concern on the parts of business, labour and governments that the benefits potentially achievable from the large projects being proposed and undertaken in this country would not be adequately captured for Canadians. The Task Force undertook, among other things:

- to identify the major projects which may be carried out in Canada over the period to the year 2000;
- to consider the long-term contributions that major capital projects could make to the growth of Canada's technological and industrial base;
- to identify impediments to the full realization of the industrial and regional benefits associated with such projects; and
- to subsequently recommend appropriate policies and actions aimed at maximizing the potentially achievable benefits to Canada, taking into consideration the broader economic and social dimensions of such benefits.

The complete terms of reference established for the Task Force are included as Appendix B.

## Major Projects Defined

For the purposes of the Task Force study, a major project was defined as a specific investment which,

either through the size of the initial capital investment or through some anticipated major effect, will have a significant impact on the Canadian economy, excluding real estate and property development projects. The identified projects fall largely within energy-related sectors, including the electric power generation and transmission and hydrocarbon sectors; however, major projects are also expected to be carried out in the forest products, mining, primary metals production, manufacturing, transportation and defence sectors. Such major project activity will affect all regions of Canada.

## Methodology

The methodology utilized by the Task Force to study these projects and the potential benefits arising from them focused on an examination of actual, as opposed to hypothetical, projects. It was felt that such an approach provided the best opportunity to take advantage of and apply the knowledge and expertise of the Task Force members, since the membership included many individuals with first-hand experience with major projects, either as owner/sponsors, suppliers of goods or services, or representatives of organized labour.

Part of the task, then, was to prepare an inventory of major projects in the various industrial sectors. This inventory was designed to include all major projects currently proposed for construction in Canada over the period to the year 2000. The requirements of these projects in terms of manpower; technology; project management, engineering, procurement and construction (MEPC) services; manufactured inputs and financing then had to be assessed. Four subcommittees were set up along major sectoral lines to gather the required information for the Task Force's work. Once anticipated major project demands were identified, it was then necessary to assess the ability of the Canadian supply community to meet the aggregate demands. Five supply-oriented subcommittees were established to perform this work and to then address the objective of identifying areas where opportunities were felt to exist for expanding Canadian involvement

in major projects. Constraining factors affecting these opportunities were also identified. Two additional subcommittees examined the role of multinational enterprises (MNEs) and the role of government in the planning and construction of major projects, as well as their broader responsibilities for achieving maximum industrial and regional benefits for Canada. The list of Task Force subcommittees is included as Appendix C. Based on this work, recommendations were formulated dealing with steps that should be taken to help overcome constraints and take advantage of opportunities presented by major projects in order to enhance the resulting Canadian industrial and regional benefits.

## Report Format

The subsequent chapters of this report summarize the above-described work and present the findings and recommendations of the Task Force. The high-level objectives that relate to maximizing Canadian industrial and regional benefits from major projects are discussed in Chapter 2. Chapter 3 provides background information to the study of major projects, including: a discussion on the national and international economic climate affecting development; an historical perspective on industrial and regional benefits considerations associated with past major Canadian projects; and, finally, the general characteristics of major projects which give rise to opportunities for increasing benefits to Canada.

In Chapter 4, the inventory of major projects prepared by the Task Force is discussed by sector. Opportunities arising out of these projects, and the constraining factors potentially limiting such opportunities, are analyzed in Chapter 5. Chapter 6 summarizes the major findings of the Task Force and puts forward recommendations for actions to help increase the level of Canadian industrial and regional benefits achievable through the planning and construction of major projects. The final chapter of this report discusses a proposal relating to how the Task Force's recommendations might best be implemented.



Ontario will be an important supplier to major projects of various inputs including primary materials such as steel as well as manufactured products



This report has been written to record findings and make recommendations to ensure that future major projects carried out in Canada are planned and constructed in a way which will maximize Canadian industrial and regional benefits and thus contribute to broader Canadian aspirations. Inherent in such a contribution is a strengthened base of economic activity, supported by an appropriate policy environment and adequate knowledge by all affected parties of the plans of major project owner/sponsors and Canadian capabilities.

## OBJECTIVES

At the most fundamental level, benefits from major projects take the form of income to Canadians, either through employment or through returns on invested capital. The Task Force, however, has considered the benefits which might arise in terms of the broader objectives which support the quality of life to which Canadians aspire. These objectives are identified in the following points.

### ECONOMIC BASE

#### Employment and Manpower

In both the short and long term, it is essential that major Canadian projects be planned and constructed in a manner which will provide the maximum possible quantity and quality of long-term, satisfying job opportunities to Canadians.

#### Technology

The development and use of technology is becoming increasingly crucial to economic development and long-term competitiveness. Future major Canadian projects offer exciting technological challenges and unique opportunities for Canada to stimulate:

- the growth of Canadian research and development expertise;
- the development of Canadian-controlled technology;
- reduced imports into Canada and increased exports from Canada of goods and services.

#### Industrial Base

It is desirable that the Canadian industrial base achieve a greater capability to supply manufactured goods and services.

##### *Manufacturing*

Major projects can help to strengthen Canadian manufacturers through project demands for materials and equipment. This can occur either through increased use of existing facilities or through creation of sufficient demands to support expansions or greenfield facilities to replace products presently imported.

##### *MEPC Capability*

Major projects can also contribute to growth and utilization of Canadian services, particularly in the area of project management, engineering, procurement and construction (MEPC). Such growth and increased utilization will help Canada to:

- acquire technological expertise;
- develop Canadian sources of supply for manufactured goods;
- reduce imports into Canada and expand exports from Canada of goods and services.

#### Finance

Major projects in some economic sectors such as forest products, mining and primary metals export a large proportion of their output. Domestic energy production serves to reduce imports. As a result, Canada's long-term balance of payments deficit is eased and Canadian domestic financial strength is enhanced.

## POLICY ENVIRONMENT

### Canadian Participation, Ownership and Control

Participation and control by Canadians in all phases of domestic economic activity is desirable. Major projects, through their contributions to the Canadian capital base, offer the opportunity to increase future levels of beneficial Canadian ownership and control in industrial entities operating in Canada.

### Regional Equity

Equity between Canada's regions in terms of opportunities and life-style is an integral part of Canadian aspirations. Major projects have an important role to play in achieving this goal by their presence and by the supply opportunities they can create.

### Legislation and Administrative Practice

A stable environment is conducive to Canadian development. Consistent and complementary legislation and regulatory approaches between all jurisdictions would allay much of the uncertainty and adversarial atmosphere which presently exists throughout Canada and would encourage increased economic activity.

## INFORMATION AND PLANNING

It is apparent that the ability to set objectives and monitor success in meeting them can only be accomplished by understanding existing and potential Canadian manpower, manufacturing and service capabilities and demands. Prerequisite to such understanding is information. Major projects can help facilitate the development of such information as they are large consumers of labour, goods and services. They therefore provide an opportunity to gather

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significant data regarding demands and also to monitor and assess supplier performance and future supply capability.

## **BENEFITS LIST**

Major projects can contribute to these objectives in a number of ways. The specific benefits that the Task Force sees as potentially arising from these projects have been set down in the remainder of this section. This has been done in order to have a clearer standard against which to assess projects in fulfilling their potential contribution in respect to benefits to Canada, and to give direction to the Task Force's recommendations.

The most important of these potential benefits is the provision of employment opportunities. There are two reasons for this. First, Canada is currently experiencing serious unemployment, and this presents an obvious opportunity for achieving benefits. Second, employment has a qualitative dimension which involves, among other things, job satisfaction and conditions and security of employment. While employment is the most important potential benefit from major projects, the basic viability of a project — including an adequate rate of return on invested capital — is a pre-condition to actually achieving any potential benefit.

Some of the policies or actions recommended by the Task Force will directly result in the achievement of income and employment benefits. Most of them, however, are intended to provide these benefits indirectly by improving the performance of Canada's economic system. Although the Task Force recommendations concern major projects specifically, the resulting improvements in the industrial structure also have the potential to provide long-run benefits outside the context of major projects.

In view of these considerations, the Task Force created the following list of areas in which benefits

might be realized. The benefits listed are often highly interdependent in a double sense. First, the realization of some benefits may require the realization of others; for example, improvements in technological capacity will require improvements in the skills of the labour force. In other cases, benefits are interdependent in the sense that the realization of one benefit will follow as a derivative of others.

### **Employment and Manpower**

While major Canadian projects will, in themselves, expand the number of job opportunities in Canada, the projects can also be used as a catalyst for the further development of the Canadian manpower base to meet the future needs of Canada's industries, through measures such as skill training and employment of occupationally disadvantaged groups. In addition, the stimulation and subsequent development of an enhanced technological and industrial base can provide Canadians with additional long-term, satisfying jobs.

### **Labour Relations**

Major projects can serve as models of good labour relations — including recognizing the spirit and letter of workers' legal right to organize and bargain collectively.

### **Technology**

Major Canadian projects represent a large market for technologies of various types and can therefore provide a real stimulus for the further development of Canadian technological capabilities. Ongoing R & D activities will be required to support such technological development, and both the technology itself as well as the related R & D can lead to the creation of new Canadian capabilities available for use in both the domestic and export markets.

### **Industrial Capability**

Major Canadian projects represent large markets for both manufactured inputs and various services,

including project management, engineering, procurement and construction supervision. The further development of Canadian technological capabilities to serve these domestic markets can help Canada to decrease its imports and potentially increase its exports of goods and services in the future. Major projects also provide significant potential benefits by way of building on Canada's resource base through the further development of processing and manufacturing activities in Canada to serve both domestic and foreign markets.

### **Supply Self-Sufficiency**

Many of the proposed major projects are in the natural resource sector and the development of these resources will contribute to Canada's increased self-sufficiency of supply in these basic commodities. In addition, Canadian self-sufficiency of supply of goods and services will be enhanced by developments in each of the following areas: manpower base; technological base; industrial base; and financial base.

### **Infrastructure**

Opportunities exist for the development of infrastructure in relation to major projects in a manner which provides long-term benefits, such as new or improved transportation and communications facilities, to other industries and local communities.

### **Expertise and Credibility**

The involvement of Canadian firms and the successful use of Canadian technology, products and financing in major Canadian projects will demonstrate Canadian expertise, thus contributing to the potential for future exports.

### **Canadian Identity**

Further development of Canadian capability to plan and construct major projects and Canadian ownership of them will enhance Canadian identity. Moreover, Canada's reputation as a country able to supply high

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technology products and services in addition to raw materials will be enhanced, both in the eyes of Canadians and in an international context.

## **Finance**

Due to their large capital requirements, major Canadian projects provide opportunities for Canadian institutions to further develop and demonstrate innovative methods for mobilizing the necessary funds. Canadian major projects provide investment vehicles for Canadian savings which will provide future benefits to the country as a whole.

## **Economic Spin-Off Effects**

Major projects will have a "ripple effect" through the economy thus increasing the opportunities available for the many small businesses filling service or support roles for both the projects and the economy as a whole.

## **Balance of Payments**

Increased use of Canadian manpower, goods and services in Canadian major projects will lower the requirements to import them and will therefore have a positive effect on the Canadian balance of payments. The maximum practical use of Canadian equity and debt markets for capital requirements will also improve Canada's balance of payments position since long-term dividend and interest payment outflows will be reduced. As well, the development of the Canadian industrial, technological and manpower base will help contribute to Canada's export potential, which in turn will have a positive balance of payments effect.

## **Canadian Ownership and Control**

Major projects can be an important means of achieving greater Canadian control of the economy, particularly in the resource sector. Canadian ownership is an important avenue for achieving such increased control. The labour members of the Task Force believe that public ownership is particularly

important in this regard. The business members recognize that an increased level of Canadian ownership is desirable and believe that such ownership should be by private means wherever possible.

## **Regional Equity**

Major projects can contribute to increased regional balance in Canadian economic growth, both by regional distribution of the projects themselves and by conscious efforts to regionally distribute their spin-off activities.

## **The Environment**

Major projects can stimulate the development of new technology (both in design and in construction methods) that will allow major projects to be undertaken with reduced impact on the environment. As well, due to their high public visibility, they offer a vehicle for promoting a heightened level of awareness with regard to environmental concerns.

## **Social and Cultural Development**

Major projects will generate wealth which can contribute, either directly or through taxation, to the financing of Canadian social and cultural programs. As well, the increased industrial activity will provide opportunities for the employment of occupationally disadvantaged groups, such as women, natives and the disabled, thus promoting greater social equity.

## **Recognition/Preservation of Heritage**

Many of the proposed major projects will be located in areas having high levels of indigenous populations. Because of the high public visibility of the projects, they can provide a vehicle for promoting a heightened level of awareness with regard to traditional and emerging cultural values, particularly as this applies to indigenous peoples. As well, by influencing the way in which projects are carried out, these values can be given some measure of protection.



Identified major projects related to hydroelectric power generation and transmission in Manitoba, based on the province's abundant water resources, total in excess of \$10 billion



The activities involved in the planning and construction of major projects have been reviewed by the Task Force within a broadly based geographic, historic and socio-economic framework. It has therefore been considered necessary to set down some background on the national and international context within which these projects are being considered. The first section of this chapter therefore comments briefly on Canada's economic structure and discusses some external influences which are likely to have a substantial effect on Canada's future development. A subsequent section provides an historical perspective on past major Canadian projects and related industrial and regional benefits considerations. The final section outlines the characteristics of major projects which make them an appropriate focus of attention for efforts aimed at increasing Canadian industrial and regional benefits.

## ECONOMIC FACTORS AFFECTING DEVELOPMENT

Increasingly, Canadians are becoming aware that they live in a rapidly changing, highly interdependent world in which major new economic relationships are evolving.

One of the principal causes of this sharp increase in awareness of the broader global environment was the OPEC "crisis" of 1973 with its overnight increase of 400% in the price of oil. This action resulted in a severe dislocation to the world economy which, for much of the previous 20 years, had been characterized by rapid growth.

Worldwide economic growth has slowed dramatically during the past several years. Virtually every country in the world is in the process of adjusting its social, financial and industrial infrastructure to accommodate continuing rapid increases in energy prices. Additionally, individuals and nations are becoming increasingly aware of their dependence on the supply of strategic materials from potentially unstable regions of the world, and are therefore developing a

greater understanding of the need for self-reliance.

Major capital investments are being made throughout the world to meet national security of supply objectives, particularly with respect to energy. Major projects are underway employing new and existing technology to acquire energy from what have been uneconomic or politically or socially sensitive sources (e.g., offshore oil and gas, tar sands, coal gasification, wind, atomic power, etc.). This overall pattern of investments connected with energy is likely to accelerate substantially over the period to the year 2000.

Looking at the global resource challenge, the Major Projects Task Force believes that Canadians are starting from a highly favoured position. Canada's physical resources are exceedingly abundant and include minerals, fresh water, agriculture, forestry, fishing and all forms of energy. With few exceptions, Canada can be, or already is, self-sufficient in many of the materials critical to an industrialized economy. Canada therefore enjoys significant comparative advantages which can and must be utilized over the next two decades.

In spite of these advantages, there are certain characteristics of Canada's geography which impose costs on the Canadian economy which are not a factor in many other countries. The sheer immensity of Canada's territory poses an awesome requirement for infrastructure. As well, territory and climate result in the Canadian consumption of energy being among the highest in the world on a per capita basis. Much of Canada's effort and attention has therefore traditionally been focused on energy resource and infrastructure development, and these areas have historically played a major role in much of Canada's economic activity.

Investment capital required to support the development of Canada's infrastructure systems and energy and other natural resources has come from various sources over the years. In the early stages of development (up until the outbreak of World War I), the country's previous colonial ties with Great Britain

prevailed and much of the capital required came from this source (largely in the form of debt). Since that time, there has been a shift in emphasis towards U.S. equity investment, particularly in the manufacturing, petroleum and mining sectors. This has resulted in a substantial degree of foreign control in these Canadian industries, although some reduction has taken place in more recent years. Canadians have generally retained control in infrastructure and utilities-related sectors. These trends are illustrated in Table 3-1.

Within the manufacturing sector, Canada has traditionally provided substantial tariff protection to Canadian-based manufacturers. Other advantages were provided through preferential tariff arrangements with Britain and the rest of the Commonwealth. Initially, such arrangements helped Canadian industry establish and prosper. Later, however, foreign manufacturers found it advantageous to establish facilities in Canada in order to better compete in Canadian markets and at the same time gain access to preferential Commonwealth tariffs. Unfortunately, most of the resulting branch plants were of modest size designed solely to gain access to these markets.

Foreign firms have invested in the Canadian energy and other natural resource sectors mainly for the purpose of acquiring captive sources of raw materials for processing abroad. As a consequence, sufficient linkages have not been established between Canada's strengths in natural resources and the manufactured goods such resources can produce. Indeed, the advantages offered by government incentives and tax concessions established to encourage Canadian resource development have frequently and persistently passed to foreign-owned firms prepared to carry out such developments.

Just as the Canadian national economy, in the early years of its development, revolved around British Commonwealth tariff preferences that encouraged the export of Canadian raw materials and the importation of finished goods manufactured by others, so a similar arrangement developed among regions within

Canada. The "frontiers" essentially became dependent on central Canada as a market for and a processor of their raw materials. In turn, central Canada developed as the country's prime domestic source for manufactured goods largely as a result of population, capital and ready access to inexpensive power and transportation.

As a legacy of this history, it is not surprising that each province has developed a substantial desire to influence its own regional development. In the context of the federal constitutional mandate, a number of areas — especially with respect to industrial and regional benefits — are unclear. It has been argued both that such interests are inside and outside federal jurisdiction. The strains of ongoing federal/provincial jurisdictional debates concerning key areas such as resource ownership, revenue sharing and maximization of national benefits provide a highly uncertain environment in which future major projects are currently being conceived.

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## INDUSTRIAL AND REGIONAL BENEFITS — AN HISTORICAL VIEW

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Until the early 1950s, major Canadian project activity was predominantly concentrated in the infrastructure, electrical power generation, forestry and mining sectors. Consequently, a high level of Canadian capability was developed in related areas of technology, engineering design and construction, and to a lesser extent in the manufacturing facilities of equipment suppliers.

In the middle and late 1950s, Canada embarked on a massive investment boom during which many major projects were carried out. These projects were largely natural resource related and included oil, gas and mining developments along with some significant additions to infrastructure. Examples of projects completed during this period are the St. Lawrence

Seaway, the major interprovincial gas and oil pipelines, and the development of Labrador iron ore deposits. Major investments in petroleum exploration and development also occurred at this time. In several of these developments, not only the capital but also much of the technical expertise employed was non-Canadian. This was particularly true in the oil and gas sector. Concurrent with this activity, sustained public expressions of concern about the magnitude and effects of foreign investment in Canada began to be heard. Canadians became concerned that, as a result of the established linkages associated with foreign investment, they were not being adequately involved in the large projects being proposed and undertaken in this country.

Throughout the 1960s, federal and provincial government policies continued to aim at encouraging major developments, frequently involving foreign equity ownership. Modest federal government initiatives were undertaken, however, including tax measures, which were designed to encourage the participation in such developments of Canadian-owned firms. At the same time, governments continued past practices of providing investments in infrastructure to support resource development. Announcements were made that the Canadian North and its resources were to be opened for development. These areas were federal lands and the Canadian government therefore had complete jurisdiction over proposed developments. The federal government began to use its legislative powers to more purposefully direct the activities associated with the development of Canada's northern resources.

In 1972, the Canadian government established a policy that a minimum level of Canadian content was an essential prerequisite to any major development project on Canadian lands in the North. In May 1975, the award of a contract to a Canadian-based subsidiary of a U.S.-owned firm for the design and construction of a major gas processing plant in the Mackenzie River Delta was followed by an in-depth analysis of federal policy with respect to energy and resource development in areas under federal

jurisdiction. This led to the establishment of the Advisory Committee on Industrial Benefits from Natural Resource Development (the ACIB). The group's original mandate was to monitor industry approaches to major resource developments on Canada lands to see whether or not government objectives were being met.

In a letter sent to resource developers at the time of the formation of the ACIB (September 1975), the then Minister of Indian and Northern Affairs stated government objectives in respect to industrial and regional benefits as including:

- "— increased sourcing of equipment and services in Canada emphasizing those with a substantial level of technological and innovative input by Canadians with a view to encouraging the growth and establishment of firms in Canada with independent, ongoing capabilities;
- "— the supply of these services and equipment on a fair and internationally competitive basis;
- "— increased participation of firms beneficially owned and controlled by Canadians;
- "— encouraging industrial activity in the disparate regions of Canada;
- "— encouraging resource companies to rationalize their sourcing by purchasing in Canada for their world operations."

Largely as a result of this initiative, the Minister was able to comment favourably in mid-1976 on the award of a multi-million dollar engineering contract for a proposed gas processing plant north of Inuvik to a joint venture led by a Canadian-owned firm.

It is significant that, although the ACIB was originally set up to monitor projects on federal lands, since its inception eight out of Canada's ten provinces have joined the Committee in a cooperative effort to increase the level of industrial benefits accruing to all of Canada from resource projects.

The Syncrude Project in northeastern Alberta, undertaken in the mid-1970s, was the first major

**TABLE 3-1**  
**Foreign Control as a Percentage**  
**of Selected Canadian**  
**Non-Financial Industries.**  
**Selected Years, 1926-76**

Manufacturing		Petroleum and natural gas		Mining and smelting		Railways		Other utilities		Total of above industries plus merchandising	
55		58	3	20	17						1926
36		47	3	29	20						1930
58		42	5	26	21						1939
45		40	3	26	25						1948
51	60	51	2	8	28						1954
57	73	60	2	5	32						1958
60	74	59	2	4	34						1963
59	73	60	2	4	34						1965
58	74	65	2	5	35						1967
60	74	70	2	6	36						1969
58	77	71	2	7	36						1971
59	76	56	2	7	35						1973
56	74	60	1	4	33						1975
55	68	55	1	4	31						1976

\*Petroleum and natural gas combined with mining and smelting for years 1926, 1930, 1939 and 1948.

**SOURCES:**

- Canada's International Investment Position, 1926-1967. Ottawa: Statistics Canada; Dec. 1971; pp. 108 and 124-127.
- Canada's International Investment Position, 1976. Ottawa: Statistics Canada, May 1980; pp. 112-113.
- Canada's International Investment Position, 1977. Ottawa: Statistics Canada, January 1981; pp. 114-115.



Canadian hydrocarbon project in which serious efforts were made to expand Canadian involvement in all phases of design, procurement and construction. Syncrude was successful in packaging work in ways which enabled more involvement by Canadian engineering and construction organizations than historically had been the case, but project management and the development of key areas of related technology remained in the hands of non-Canadian entities.

During this same period (1975-77), regulatory hearings were being held on applications to move Alaskan gas through Canada to the U.S. The successful applicant for the Canadian portion of the system included in its submission a commitment for an extensive program directed towards increasing Canadian involvement in all aspects of its project, including the provision of manufactured inputs and services such as project management, engineering, procurement and construction.

Since its inception in December 1978, the Major Projects Task Force has had a unique opportunity to consider the long-term contributions that major capital projects can make to the growth of Canada's technological and industrial base and to identify impediments to the full realization of the industrial benefits of such projects.

## **MAJOR PROJECTS — A FOCUS FOR REALIZING BENEFITS TO CANADA**

The business and labour members of the Task Force believe that, given the appropriate policies and actions, the level of benefits accruing to Canadians from major capital projects can and should be substantially increased. It is also recognized that the increase in benefits has the potential to markedly and favourably affect future Canadian industrial and economic performance.

Investment in major capital projects, particularly in the natural resource sector. Major projects already being seriously considered will involve expenditures of more than \$400 billion by the end of the century, with much of the presently proposed investment naturally concentrated in the 1980s. This represents more than one-fifth of the total projected investment in the economy over the period to the year 2000. Expenditures of this magnitude will generate a substantial demand for labour; management, engineering, procurement and construction services; technology; manufactured products; and capital. Major projects and their requirements thus represent a special opportunity for Canada to strengthen and expand its economic and industrial base in a manner which can continue to provide long-term benefits in the future. Realizing benefits of such importance will therefore require special attention.

Certain characteristics of major capital projects make them particularly amenable vehicles for increasing benefits to Canada:

1. Major projects are identifiable, distinct entities, thus facilitating analyses which focus on concrete problems and practical solutions.
2. Major projects are of such a size and have such potential impact, both individually and in aggregate, that opportunities exist to make significant long-term improvements in the industrial structure by influencing the way in which projects are carried out.
3. Major Canadian projects proposed for implementation over the period to the year 2000 are well distributed in impact throughout many major industrial sectors. It is particularly significant that a number of these projects involve developing sources of raw materials, which in themselves provide opportunities for generating additional economic activity through downstream upgrading. This, in turn, could result in closer integration between the Canadian resource and manufacturing industries.
4. The impacts of the major Canadian projects proposed for implementation over the period to the

year 2000 will be distributed throughout all regions of Canada. These projects can thus provide opportunities for building stronger regions as well as a stronger country.

5. Major projects are highly visible to the public, and the key actors in project planning and execution are therefore likely to be subject to more than usual pressure to perform in ways which are in the best interests of Canada.

6. The nature and significance of major projects are such that government influence and/or participation are markedly higher than is the case in other industrial activities.

From the perspective of industrial benefits, one of the major attractions of directing attention to major projects is the fact that, individually and in aggregate, they provide a potential catalyst for strategic industrial change and therefore offer a means of moving Canada closer to realizing its economic and social potential. Many countries have concentrated their efforts on particular areas of industrial activity in the pursuit of their national objectives. The planning and construction of future major Canadian projects may offer a similar focus. It should also be noted that even though individual major projects may represent only a small proportion of the economy, they have recently assumed a profile that provides public interest or other groups the opportunity to espouse their particular concerns and points of view. In Canada, for example, over the last decade, they have provided the forum for discussion of land claims, environmental impact, affirmative action and social benefits, in addition to economic and industrial considerations.



Brisk demand growth is anticipated for potash and other fertilizer products, such as are produced in the province of Saskatchewan



## OVERVIEW

### Independent Investment Projections

Various estimates have been made of the magnitude of major projects over the period to the year 2000, particularly in relation to the energy sector. A 1977 study by the federal Department of Energy, Mines and Resources (EMR)\* estimated a requirement of \$180 billion of investment — based on 1975 currency values — to bring on increased energy supply in Canada over the period 1976 to 1990. In 1980 dollars, this figure would amount to approximately \$275 billion. The Toronto Dominion Bank, in an estimate prepared in 1977\*\*, projected energy investment for the period 1978 to 1990 at \$325 billion in current, or as spent, terms. In 1980 dollar terms, this would amount to approximately \$200 billion. A more recent study, undertaken by the Royal Bank for the sponsors of the Polar Gas Project\*\*\*, projected a cumulative 1979-2000 energy investment of \$1402 billion in current dollars, with \$374 billion of this amount being put in place over the 1979 to 1990 period. In constant 1980 dollars, the total amount is split evenly — \$225 billion in the 1979 to 1990 period and an equal amount in the 1991 to 2000 period.

Estimates such as those quoted have been built up on the basis of a combination of project-specific knowledge, as well as "macro" judgements on overall sector investment in the context of historical levels and in the context of the sector in relation to total investment and total economic performance. Obviously, the former project-specific approach has greater weight in early periods and the latter

"macro" approach has greater weight in later periods when specific project specifications are vague.

There are many other efforts in this context that could have been discussed, but those referred to here are a good representative sample. Despite differences in these studies, one thing is clear. Canada is entering a period when energy investment (the great bulk of which can be categorized under the description "major projects") is going to be significantly higher than previous experience, both in absolute terms and in relation to total investment and total economic activity.

### Major Project Inventory — Scope and Methodology

This Task Force has not made an attempt to set down a "definitive" forecast or projection of major projects to the year 2000, nor to put these projects in a macro-economic framework. However, the Task Force has assembled a detailed inventory (see Appendix F) listing projects currently identified which will cost \$100 million or more. By "currently identified," it is meant that these projects are being seriously considered, at least with respect to their feasibility, and are viewed by a potential sponsor as realistically proceeding before the year 2000. This inventory is in no way comparable to the previous efforts at projecting investment activity. It is a purely project-specific listing where projects have various probabilities — high, medium and low — of actually being implemented. Some of the projects will definitely not proceed; on the other hand, many projects not currently even a "gleam in the eye" of a project sponsor will go ahead.

The Task Force has been in a unique position to assemble this inventory of major projects. Its membership consists of a wide variety of individuals involved in major projects in such roles as owner/sponsors; providers of management, engineering, procurement and construction services; representatives of labour employed on the projects; financiers; and suppliers of machinery and equipment.

Through their knowledge of the projects they are directly involved with, as well as other projects with which they are familiar, the members of the Task Force have been able to prepare a much more complete picture of major projects than previously possible.

The inventory is based on information concerning investment intentions within various sectors obtained during the course of subcommittee work and through a canvass of Task Force members. It includes, as previously mentioned, only those projects with a cost of \$100 million or more. Because of the wide variation of information sources, the project cost estimates included in the inventory are not stated on a completely consistent basis throughout. It is understood that most of the estimates are escalated to the year of expenditure by taking expected inflation rates into account. In some cases, however, constant 1980 dollars are used. In a few other cases, where projects have been delayed, cost estimates are stated as if the project had commenced as planned at the time the cost estimate was prepared and have not been adjusted to reflect recent schedule changes. Finally, a number of projects were identified without cost estimates, and in those cases order-of-magnitude capital costs have been estimated by the Task Force.

### Summary of the Inventory

The detailed inventory is presented in Appendix F, and a summary is presented in Table 4-1. The total inventory amounts to close to \$440 billion. The great majority of this — 87% — is in five energy-related sectors: electric power generation and transmission; conventional hydrocarbon exploration and development; heavy oil development; pipelines; and hydrocarbon processing and petrochemicals. In terms of geographic distribution, almost 30% of the total project expenditures will be accounted for by projects located in Ontario and Quebec; over 25% by projects in B.C. and the Yukon and Northwest Territories; close to an additional 25% by projects in Alberta, Saskatchewan and Manitoba; and over 10% by projects in Atlantic Canada. An additional 10% falls

\*Energy, Mines and Resources: "Financing Energy Self-Reliance"; Report EP-77-8; Ottawa; 1977.

\*\*Toronto Dominion Bank (D. Peters); "Energy Investment and the Canadian Economy"; Business and Economics #6; June 1977.

\*\*\*Royal Bank of Canada (D.G. Waddingham); "The Canadian Balance of Payments to the Year 2000 with an Assessment of the Impact of the Polar Gas Pipeline Project"; November 1979



Routine maintenance at a refinery

into the "multi-provincial" or "location undetermined" categories.

To put the total inventory figure in perspective, it is equal to 1.5 times the 1980 GNP, over 10 times the 1980 total business non-residential fixed investment, and more than 23 times the 1980 energy sector fixed investment.\*

In the following sections, the major projects identified in the inventory are discussed by sector, particularly in relation to the demands on the Canadian economy that they will generate. The reconciliation of these demands with Canadian supply potential is discussed in the next chapter.

## HYDROCARBONS PROJECTS

Major projects considered under this general heading include projects in the conventional hydrocarbon exploration and development, heavy oil development, pipelines, and processing and petrochemicals sectors. Major project expenditures in these areas amount to \$181 billion for the period to the year 2000. Over 40% of this spending involves conventional hydrocarbon exploration and development projects. Heavy oil development involves close to 25%, almost 20% is in the pipelines sector, and more than 15% involves hydrocarbon processing and petrochemicals. Together, these four areas of hydrocarbon-related projects account for over 40% of all projected major project expenditures.

### Conventional Exploration and Development

Conventional hydrocarbon exploration and development projects are concentrated in the Yukon

and Northwest Territories, although spending of approximately \$11.5 billion is expected in the Atlantic provinces. Some of the capital projects in this sector will be very large. Four projects, costing \$8 billion and more each, make up approximately 85% of the total projected spending on conventional hydrocarbon exploration and development of \$78.2 billion.

### Heavy Oil/Oil Sands

Heavy oil development projects, located solely in Alberta and Saskatchewan, will also be large, with five projects, costing \$5 billion and more each, accounting for over 90% of the \$42.7 billion projected to be spent in this sector.

### Pipelines

In the pipelines category, expenditures total \$31.6 billion. The Alaska Highway Gas Pipeline Project and the Polar Gas Project together account for close to two thirds of the total. The majority of the identified major pipeline projects tend to be multi-provincial in nature.

### Processing and Petrochemicals

Expenditures in the hydrocarbon processing and petrochemicals category amount to \$28.5 billion, with more than three quarters of this in Alberta and British Columbia. These types of major projects tend to be smaller than the others under the general category of hydrocarbons, with only nine of over 50 identified projects estimated to cost \$1 billion or more. These nine projects represent over 60% of the total major project expenditures in the processing and petrochemicals sector.

Major projects falling under the general category of hydrocarbons projects require massive inputs of materials, equipment and manpower, but it is difficult to generalize about the relative importance of these inputs, considering the wide variety of different types of projects involved.

There is a wide variation, for example, between the

\*Based on the following 1980 estimates prepared by Data Resources Inc:

- GNP \$284.4 billion
- business non-residential fixed investment: \$43.4 billion
- energy sector fixed investment: \$18.8 billion

**Table 4-1**  
**Summary of Inventory of Major Projects**  
**To The Year 2000**  
*(millions of dollars)\**

SECTOR	% OF TOTAL EXPEN	TOTAL	MULTI PROVINCIAL OR UNDETERMINED	ATLANTIC	QUEBEC	ONTARIO	MANITOBA	SASK	ALBERTA	P.C.	YUKON N.W.T.
Conventional Hydro- carbon Exploration & Development	17.8	78 150	2 500	11 500					700	250	250
Heavy Oil Development	9.7	42 735						1 750	40 985		
Pipelines	7.2	31 640	27 090	1 185						890	2 475
Processing & Petrochemicals	6.5	28 505		500	3 100	985		1 300	12 205	10 415	
Electrical Gen & Trans.	45.3	198 855	620	29 870	66 335	38 435	10 375	3 160	20 250	29 710	100
Forest Products	1.8	7 710		310	1 210	1 665			1 200	3 325	
Mining	4.5	19 935		1 010		4 100	500	3 965	3 230	5 625	1 505
Primary Metals Prod.	1.4	6 235		1 025	1 300	1 410	500			2 000	
Transportation	1.4	6 355		420	2 315	450			955	1 885	330
Manufacturing	3.1	13 380	8 575	400	175	4 080			150		
Defence	1.2	5 105	4 825	280							
TOTAL		438 005	43 610	96 500	74 455	51 125	11 475	5 275	77 75	64 80	
% OF TOTAL EXPENDITURES			9%	10%	17%	11%	2%	1%	18%	15%	

**\*NOTE:**

Because of the wide variation of information sources, the project cost estimates included in the inventory are not stated on a consistent basis throughout. It is understood that most of the estimates are escalated to the year of expenditure by taking expected inflation rates into account. In some cases, however, other dollar bases have been utilized.



types of inputs required for conventional exploration and development projects, compared with projects utilizing newer methods, such as tar sands and heavy oil. Conventional methods, which include offshore and frontier operations, are typically capital intensive, with more than 80% of total costs falling into the equipment and materials categories. Labour required for installation generally accounts for less than 2% of the cost of these types of projects, since most employment is associated with the fabrication of major components elsewhere. Tar sands and heavy oil developments, however, require much larger on-site labour inputs, estimated to average close to 30% of total project costs. For example, it is estimated that two of the largest projects in this category, Alsands and Cold Lake, will require 35 000 man-years of construction labour with a peak labour force requirement of 14 700. There will also be substantial additional labour requirements in off-site prefabrication and marshalling yards. (It is also noteworthy that these two oil sands projects are estimated to require at least 5600 operating employees, a much greater proportion than is typically the case for most other major projects.)

For the Alsands Project, estimated levels of potential Canadian content vary from close to 100% for products such as tanks, heat exchangers and structural steel, to less than one third in the case of mining and material handling equipment.

Pipeline projects generally involve less than 15% of expenditures for construction labour, but close to 20% may be required for services, which have a substantial labour content. Materials and equipment make up approximately 60% of the expenditures for a typical pipeline project.

Hydrocarbon processing projects may involve either an expansion of existing conventional refining capacity, or new capacity to handle heavy oil and its derivatives. Expenditures for refinery projects typically involve 10 to 20% on engineering, with the balance split roughly equally between equipment, materials and labour.

Where the primary output of a processing plant is a product or products other than fuel, the plant is usually considered a petrochemical project rather than a refinery. Projects in this category tend to be somewhat less labour intensive, with 20-25% of expenditures devoted to construction labour.

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## ELECTRIC POWER GENERATION AND TRANSMISSION PROJECTS

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Electric power generation and transmission projects make up the largest single category of major project activity considered by the Task Force, accounting for over 45% of all projected expenditures. Spending on these projects over the next two decades amounts to \$198.9 billion. It should be noted that electric utility investment intentions tend to be detailed for the entire period to the year 2000, whereas in other sectors specific projects have not yet been defined to the same extent. The relative impact of electric utility expenditures is thus perhaps overstated.

Electric power projects occur in all parts of Canada. Almost 55% of the total expenditures in this sector is for projects located in Ontario and Quebec, while over 30% is for projects in the western provinces (i.e., Manitoba, Saskatchewan, Alberta and B.C.) and 15% for projects in the Atlantic region.

Several types of projects are involved. The largest category, hydroelectric generation, accounts for over 45% of all electric power projects. Nuclear plants account for 15-20%, and thermal generation for 10-15%, with the balance split between electric power transmission and distribution projects and "special" projects such as geothermal generation.

Spending on electric power projects can be roughly broken down into 40% for equipment, 20% for materials and 40% for labour. Direct labour demands fall largely within the construction trades, however the purchase of equipment and materials, as well as engineering and technical services, also generates large labour requirements.

Products required for electric power projects include turbo-generators, hydraulic turbines, boilers, heat exchangers, piping and electronic equipment, as well as transformers and transmission equipment.

The Canadian content of electric power projects is relatively high, in part due to the fact that most of the electric utility companies pursue purchasing policies with specific preferences for Canadian-made products. Nevertheless, the foreign content is high in absolute terms, and this represents an opportunity for Canadian suppliers. Most of the foreign content falls within the equipment category.

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## MINING, METALS AND FOREST PRODUCTS PROJECTS

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Major projects included in the inventory under this general heading amount to \$33.9 billion — with \$19.9 billion in mining, \$6.2 billion in primary metals production and \$7.7 billion in forest products. Given sharply increasing costs for greenfield expansion in these categories of projects, the current posture of investment plans is leaning towards the modernization and expansion of existing facilities. Even though they are "only" modernizations and expansions, the sums involved are in some cases over the one billion dollar mark — e.g., MacMillan Bloedel's \$1.5 billion Port Alberni expansion, Alcan's \$2 billion aluminum smelter expansion at Kemano, and Potash Corporation of Saskatchewan's potash expansion amounting to \$2.6 billion.

### Mining

In the metal mining sector, despite the cyclical characteristics of demand, the longer-run growth trend of world demand is seen as significant — with particularly strong growth projected for lead, zinc and copper. In the non-metal mining sector, above-normal growth in demand is anticipated based on energy developments which affect coal particularly,



Checking quality in a paper mill

and brisk demand growth is also expected for potash and other fertilizer products. In terms of regional orientation of investment activity in the mining sector, close to 70% of the total mining project expenditures is for projects located in western Canada (i.e., Saskatchewan, Alberta and B.C.).

### Primary Metals

In the primary metals production sector, the predominant products are aluminum and steel. Potential aluminum smelter projects account for close to 70% of the expenditures in this sector. There are fewer major projects in steel, since the recent Stelco installation at Nanticoke on Lake Erie has already significantly expanded Canadian capacity.

### Forest Products

In the forest products sector, a large modernization and expansion program is underway. Much of this modernization and expansion activity is taking place in Ontario, Quebec and B.C., while the majority of greenfield expansion is oriented towards the western provinces (i.e., Alberta and B.C.).

The major categories of inputs required for projects in the mining sector include mining and material handling equipment, as well as crushing, grinding and flotation equipment. Projects in forest products typically utilize forest harvesting equipment and pulp and newsprint production equipment.

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## TRANSPORTATION, MANUFACTURING AND DEFENCE PROJECTS

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Expenditures on major projects grouped under the transportation, manufacturing and defence categories total \$24.8 billion over the period to the year 2000. Transportation projects in this group relate to the new installation or expansion of transportation facilities (e.g., ports, railways, urban transit systems, barge systems, etc.). Major manufacturing projects

listed in the inventory include projects in the marine, aerospace, automotive and other manufacturing industries. Anticipated expenditures by the Department of National Defence (DND) for fighter aircraft, patrol frigates and military support facilities are covered in the defence category.

### Transportation

Of the total projected expenditures of \$6.4 billion in the transportation sector, approximately 45% is for urban transit projects, 20-25% for rail transport projects, and 20-25% for marine transport projects. The remainder is split between projects in the air transport industry and major highway construction projects.

In terms of regional distribution, just over 50% of the anticipated expenditures in transportation is for projects located in Atlantic Canada, Quebec and Ontario, while the remainder is for projects located in Alberta, B.C. and the Yukon and Northwest Territories. The two predominant provinces are Quebec and B.C., with projects located in these provinces representing approximately 36% and 30%, respectively, of total transportation project expenditures.

In the marine-related transportation sector, anticipated major projects involve port facilities expansions in Atlantic Canada, Quebec and B.C. and a barge system in the Northwest Territories. Major mass transit system projects are located in Montreal, Toronto, Edmonton, Calgary and Vancouver and will cost close to \$3 billion. Rail system construction and upgrading projects in western Canada will involve more than \$1 billion in expenditures. As well, light, rapid and comfortable (LRC) train operation in the corridor between Windsor and Quebec City will be established over the next five to 20 years.

Major projects in the transportation sector generate high demands for both skilled and unskilled labour, particularly in the construction trades. Large quantities of construction materials, such as steel, concrete and aggregate, are required. Other areas of



Coal terminal on the west coast

demand include rolling stock and electrical and electronic products (e.g., for signal and control systems).

## Manufacturing

Projected expenditures over the next two decades for major projects in the manufacturing sector total \$13.4 billion, or approximately 3% of total anticipated major project expenditures.

In the marine manufacturing sector, several major projects are scheduled, totalling in excess of \$8 billion. These include tankers and barges required to support efforts in the hydrocarbons sector, as well as a trawler replacement program designed to upgrade the east coast fishing fleet. An additional \$2 billion is projected for marine-related projects in the defence sector.

In the aerospace manufacturing sector, the listed major projects are related to the manufacture of smaller (under 100 seats) aircraft such as the Dash 8 and the Challenger executive jet. Demand for these aircraft is likely to be strong during the next decade, partially as a result of the trend towards smaller commuter aircraft in Canada and the U.S. In addition to these projects, anticipated spending by DND for fighter aircraft amounts to \$2.9 billion.

Although it is not directly covered in the major project inventory, it is interesting to note that firm orders for the larger commercial aircraft for the next ten years are estimated at \$1.8 billion and the major airlines hold options on another \$1.6 billion worth. The purchase agreements for these aircraft, as well as those for the defence aircraft mentioned above, include substantial offsets. Considerable capital expansion in the Canadian aerospace sector is expected to follow.

In the automotive manufacturing sector, major projects include three engine plants, one transmission plant, two major plant conversions, and one tire plant. Although there may be substantial additional investment activity in relation to the downsizing

programs, most of these investments cannot be categorized as major projects.

Miscellaneous major manufacturing projects listed in the inventory include the manufacture of semi-submersible drilling rigs to support offshore hydrocarbon exploration and development, as well as a major cement plant expansion.

With respect to regional distribution of major manufacturing projects, the large majority of these projects will be located in central and eastern Canada.

## Defence

As noted above, major projects are expected to be stimulated in the defence sector by purchases of fighter aircraft and patrol frigates by Canada's Department of National Defence. As well DND is planning to expand its Halifax military base. These defence-related major projects total in excess of \$5 billion.



Alberta's growing petrochemical industry provides an excellent example of how natural resource development can be integrated with downstream secondary processing and manufacturing



The benefits associated with major projects develop from the economic activity the projects generate. Such benefits result directly from enhancements to the components of the economic base, such as manpower and employment, technology, industrial capacity and financial capability. Indirectly, benefits also result from the linkages between economic units, such that an action in one area may have favourable effects in another. Acting to support or forestall a strengthening of the base is the Canadian economic, institutional and industrial setting. This chapter of the report reviews areas of opportunity and outlines the factors which presently limit Canada's ability to capture specific benefits. In the next chapter, the Task Force offers its recommendations for dealing with these constraining factors.

It is clear from the work of the Task Force that substantial gaps exist in both the quality and consistency of the information surrounding major projects. To some extent, this has required reliance on the informed opinion of members of the Task Force rather than analysis of detailed objective background material. It is hoped that this report can provide the impetus for better information to be generated and made available in the future. Indeed, the availability of reliable data is absolutely essential if many of the recommendations put forward in Chapter 6 are to be implemented effectively.

The Task Force is also concerned that long-term impacts must receive greater consideration in the evaluation of major projects. If Canada is to realistically develop Canadian capabilities and achieve related benefits, it will be necessary to turn away from approaches related to short-term concerns and put greater emphasis on the long-term welfare of Canadians. Major projects can provide a chance to grasp opportunities Canadians have not realized in the past. Capturing these benefits necessarily requires that a significant level of major project activity be realized.

## EMPLOYMENT AND MANPOWER

Canada currently faces high levels of unemployment. At the same time, critical shortages exist throughout the country in some key skill areas. Surpluses of other occupational skills occur in some regions coincident with shortages of the same skills in others. This is strong evidence that the labour market is not operating efficiently.

To understand the labour market as it relates to major projects, some appreciation of Canada's basic economic structure and the way it operates is required. Unfortunately, an understanding of the relationships between levels of economic activity and employment needs does not generally allow us to predict potential impacts on specific occupational groups. Data with respect to labour supply are normally several years out of date and therefore do not reflect technological or productivity changes. Macro-economic models have been developed and used, but are limited by their dependence upon input assumptions. Nonetheless, they can be useful in testing the sensitivity of results to such assumptions.

Many groups and organizations (especially project sponsors) carry out substantial work related to manpower supply and demand, but such work is usually limited to particular industries or occupational groups. Unfortunately, the resulting forecasts often conflict as they employ very different assumptions and analytical techniques. While there is little argument about the general trends that are emerging, reliable data are virtually non-existent, demonstrating the very real need in Canada for more complete and reliable manpower planning information. The following paragraphs therefore rely on knowledgeable perceptions based on the broadly held assumption that supply deficiencies will exist without action but that suitable measures can be taken to minimize these shortfalls with resulting long-term benefits to Canadians.

## Opportunities

Chapter 4 has described the major Canadian projects currently being considered for construction during the period to the year 2000. The demands for labour generated by these projects could help to reduce unemployment, provide more satisfying job opportunities for Canadians, and increase participation by Canadians in the workforce.

Major projects will create substantial new employment opportunities, both directly and indirectly. Major projects create demands for project management, design, construction and operations personnel in the skilled and unskilled trades, and in technical and management areas. They require labour for the manufacture of major components and equipment and they involve extensive use of the service sector. Longer term opportunities exist to meet the needs for related research and product development. Finally, the infrastructure required to support other activities creates additional employment opportunities.

Direct major project manpower needs concentrate in a few areas of activity and spread into a broader occupational mix in related industries. Demands will be highest in highly skilled occupational groups such as draftsmen, technologists, technicians and construction trades and in other groups of manpower such as engineers and managers. Within these classifications, growth will be significantly greater than in most other occupations since major projects tend to be near the leading edge of technological application.

Through major project developments, indirect demands for labour will be created in association with the manufacture of required products. As just a few examples, petroleum projects will utilize oil and gas production equipment, pressure vessels and tanks, compressors, pipe, valves, fittings and instrumentation. Mining projects will require drilling and material handling equipment plus crushing, grinding and flotation facilities. Projects in the forest products sector will utilize harvesting and transport equipment as well as pulp and newsprint machinery.



Job skill training in construction

Urban transport and related support sectors will grow strongly in association with urban development and increased emphasis upon commuter transport systems. Utility system development will be strong — in the West to serve expanding population centres, and in the East as a result of energy conversions. Aerospace industrial employment will result from exports of Canadian manufactured aircraft and from offset opportunities associated with defence spending and commercial airline fleet upgrading. Shipbuilding to support northern and offshore developments and potentially to refurbish the Canadian fishing and domestic commercial fleets will also show employment growth.

This major growth in quality and numbers of jobs will be spread throughout Canada, although much of it will be concentrated in the same regions as the major projects themselves. Under traditional patterns, construction workers, permanent operating staff and service sector employment will be primarily centred near the project location. Technical skills (including research and development and MEPC skills), however, do not need to be applied so close to the physical location of the project, nor do second-level manufacturing jobs. This factor provides an opportunity to distribute employment benefits beyond the region where a given project is located.

Using examples of offshore and northern construction, major projects have begun to look to modularization and prefabrication of components nearer to sources of skilled manpower pools. Completed modules are then transported to the project site for assembly into completed facilities. Such an approach provides the opportunity to distribute work across the country and avoid straining the regional economy, which might occur if all the activities associated with a major project had to be executed locally.

Canada's current high levels of unemployment are especially severe within particular groups and regions. A large proportion of Canada's disabled and native groups are unable to find work. There is also a strong feeling that segments of the Canadian workforce —

especially women — are being seriously underutilized. Major projects have the potential to integrate occupationally disadvantaged groups into the labour force. It is particularly significant that many major projects are located in remote areas where the native population is proportionately large. Projects can thus provide opportunities to this population for skill upgrading.

A major factor influencing the need for Canada to become more self-sufficient in meeting labour skill requirements is the increasing demands for skilled people throughout other regions of the world. A larger proportion of these skills will, therefore, need to be developed in Canada in the future than has historically been the case.

## Constraints

Job vacancies which exist or develop may be filled in a number of ways. Obviously, it makes sense to utilize Canadian manpower resources first before looking to external sources. It is also important, however, that the factors constraining the ability to do so be recognized.

Canadian education and training systems, within both institutions and industry, have historically failed to equip adequate numbers of Canadians with skills which suit job market needs. In cases where skilled labour pools do exist, they are often not located near the centre of demands. Substantial labour requirements in selected occupations and areas are anticipated for the 1980s and 1990s. Without changes in the Canadian manpower delivery system, neither the current labour force nor future entrants to it will be able to meet these requirements.

### *Training and Utilization of Manpower*

The skills of the Canadian labour force do not match well Canada's skill requirements in technically intensive industries. Within these future high demand areas, there is an inadequate supply of critical skills.

These skill shortages exist in part because Canada does not train adequately in areas of need. Such



Inspecting pipeline coating

training as is carried out is largely institutionalized and tends to be generalized so that job-specific skills are not obtained. Although training programs are heavily funded, it is hard to shift priorities as needs change. This occurs because of the inflexibility of the relevant federal/provincial agreements, because the institutions themselves are reluctant to take the hard decisions necessary to cut back programs that may no longer be effective, and because of the lack of reliable demand information. The existing educational infrastructure has developed substantial inertia to some extent because it is in place but also because existing programs act as a vehicle for transferring funds into areas with limited alternative economic activity.

A lack of long-term information on career opportunities and a low social status sometimes associated with careers in the trades also tends to divert students into educational and training patterns not especially well suited to Canadian needs. Once such training has been obtained, it is often difficult to change career direction. Better advance knowledge of future needs is therefore a necessity if the results of training programs are to meet actual demands.

Peak occupational demands are often followed by periods of soft demand a few years later. Typically, entry into institutional programs occurs when demands are high for a particular occupation. The net result is often that a large number of trained people reach the market place coincident with a downturn in demand as the peak has already passed. Manpower training is an area where major efforts should concentrate on long-term solutions.

Nevertheless, the coincident development of several major projects may severely stress Canada's ability to provide an adequate, stable supply of trained personnel. Innovative approaches towards training and inter-occupational mobility will need to be developed.

An additional factor that will continue to assume great importance over the next decade is the

participation rate\* in the labour force, particularly for women. While male participation rates are historically constant at about 80% and are likely to remain so, the female participation rate in Canada increased 11 percentage points from 37% to 48% from 1970-1968. Among married women in the 15-24 age group, more than half now actively participate in the labour force as opposed to 10% in the early 1950s. Although forecasts vary as to the ultimate level which will be reached, the movement of females into the labour force is one of the most significant elements affecting labour supply.

#### *Labour Mobility*

Some skills show regional shortages concurrent with regional surpluses elsewhere. The construction industry has the greatest need for expanded inter-regional mobility. Unfortunately, worker mobility is inhibited to some extent by the lack of economic incentives, by varying provincial standards and the lack of reciprocal certification arrangements between provinces, and by social programs that vary throughout the country. It should be noted, however, that mobility is a matter of personal choice and should not be considered a substitute for programs which encourage the creation of job opportunities on a balanced regional basis.

#### *Immigration*

Until the mid 1970s, Canada avoided the need to train the required manpower by encouraging the inflow of skilled people from abroad to counteract manpower shortages. Recent immigration policies along with reduced incentives to move to Canada have greatly diminished the inflow of skilled workers. It is unlikely that this trend will alter significantly in the future. Although Canada in some cases cannot supply certain specialist skills, a policy which makes immigration the natural recourse for overcoming such

\* Participation rate is defined as the percentage of the population 15 years of age and older which is in the labour force (i.e., available for work). The participation rate for a particular group (age, sex, marital status, etc.) is the portion of that group actually in the labour force (employed and unemployed).



Electric power research centre

shortages would only serve to assure that these skills will not be developed here.

## TECHNOLOGY

Opportunities related to technology, project management, engineering, procurement and construction (MEPC) activity and manufacturing develop for many common reasons. Much of the discussion in this regard has therefore been consolidated within this section of the chapter. Although many of the concepts will also be applicable within the sections on manufacturing and MEPC capability, they will not be repeated there

### Opportunities

Major projects presently proposed for construction before the end of this century will place great demands on Canadian technological capability in many areas. Types of technologies which will be required include:

- process technology;
- materials technology;
- equipment technology;
- manufacturing technology;
- management, design and construction technology;
- electronic systems technology.

The various technologies are very closely interwoven. It is often the case that a technological development in one area will lead to a further requirement for new technology or a new application of existing technology in another. As a general illustration, consider the hypothetical sequence of events outlined in the following paragraph.

The design of a new piece of equipment developed for a particular application may incorporate requirements for materials that have special properties (e.g., high strength metal alloys). The development

of this materials technology may, in turn, necessitate the development of some new process technology (say, in the case of this example, new steelmaking process technology). New or expanded manufacturing techniques may be necessary to actually produce the new piece of equipment, while all of the production operations may be controlled and monitored using electronic computer systems.

If, following production of the piece of equipment for the original application, it is felt that the item can be modified to satisfy a similar need in a different area, then part, if not all, of the above chain of technological development activity may be repeated. These closely interwoven activity chains imply the employment of numerous technical and scientific personnel throughout the development of the product(s), while the actual production may generate additional requirements for skilled and semi-skilled labour.

The various technologies listed earlier can be considered as means to an end — they all in some way allow us to produce the things we need. However, the value of technology goes further than this. It can also offer the ability to produce needed items in a more efficient manner (e.g., by applying cost-saving or time-saving techniques).

The lesser developed countries of the world are assimilating more and more of the "mature" technologies. Canada will therefore have to make efforts to stay at the leading edge of technology in selected fields of endeavour in order to enhance or even maintain its competitive position in the world.

Domestic economic activity alone will make Canada a major consumer of various types of technology. The question to be answered, then, is "To what extent can Canadians afford to continue to rely on the importation of technology that is required for Canadian economic and industrial development?" Certainly, there will be some areas where the level of domestic demand, or even world-wide demand, will not justify the new development of a particular technology within this country, thus making it more



Inspecting the operation of oil sands mining equipment

cost-effective to import technology from abroad. However, there will be other areas where Canada has opportunities to support particular developments based primarily on domestic market demands (which, in part, will be generated by major projects), while looking as well at export potential. The greater the degree to which any particular technological development is based on Canada's natural resource advantages to begin with, the more predominant the position that can potentially be attained for such Canadian technological expertise in the world market. Any moves within Canada to increase technological innovation have the long-term potential to create more challenging jobs and increased levels of income for Canadians. However, the impacts of dislocations, particularly on workers and communities, which may occur as new technology is implemented must also be dealt with.

Representative major project demands for new Canadian technology development are discussed below.

#### *Hydrocarbons Sector*

Canadian hydrocarbon development is demanding the application of increasingly sophisticated technology. The inability to extract more than about one-third of the oil from conventional reserves makes it clear that there are real opportunities for technological advancements in reservoir engineering concepts. As conventional oil reserves decline, their apparent replacements are either found in challenging frontier environments or they involve tapping hard to reach reserves with capital-intensive, complex facilities. The potential components of Canada's hydrocarbon supply lead to the need for technology in several fields.

**TERTIARY RECOVERY** — Large quantities of "discovered" oil are potentially available from reserves already developed and on production. Recovery factors, ranging from 10% in the case of heavy oil deposits in the Lloydminster region to 35% for conventional oil (perhaps as high as 75-80% after some forms of enhanced recovery), suggest that there

is a natural need to develop programs that will increase our recoverable Canadian reserves. Although much of this technology is currently being developed elsewhere, especially in the U.S., there is a large potential opportunity for such development in Canada.

**OIL SANDS** — Technology unique to oil sands development falls into a few key areas. Much is common regardless of whether the project relies on mining or in-situ recovery techniques. Some, however, is naturally specific to the particular kind of project.

Canada has oil sands deposits containing an estimated 200 billion cubic metres of oil. The four largest deposits, all found in Alberta, are Athabasca, Cold Lake, Peace River and Wabasca. Athabasca is by far the largest and contains approximately 20 billion cubic metres of oil potentially exploitable by mining and in excess of 95 billion cubic metres of additional oil which will require in-situ processes for recovery. Both the Suncor and Syncrude mining plants are located in this deposit. All the other deposits are found at depths of 300-700 metres, too deep for mining to be considered.

The mining process has the advantage that it extracts upwards of 95% of the oil in place. The sheer scale of the mining operation (which requires the mining of about six cubic metres of oil sands for every cubic metre of oil recovered) should make Canada a world leader in mining technology. Key demand areas are for mining and material handling equipment and for the extraction process. The mining equipment currently being utilized has required substantial modifications to meet the special problems associated with the nature of the material being mined, and has been based on technology developed abroad. The basic extraction process to separate the bitumen from the sands was developed in Canada, but in terms of practical application has been made generally available to foreign firms, who offer it worldwide. The Syncrude agreement does provide all partners with access to Syncrude technology, and Canadian firms who are Syncrude participants can therefore use



Drill ship exploring for hydrocarbons in the Arctic

this technology in joint ventures with other companies.

In-situ developments, although they do not enjoy recovery rates approaching those achieved by mining schemes, are under active consideration because the majority of the oil sands cannot be tapped by mining. Recovery processes under active study use steam or underground combustion to provide a source of heat which reduces the viscosity of the bitumen thereby permitting flow to occur more easily through the reservoir to production wells, so that economic levels of production can be achieved. Major areas of technology required by these projects are: oil/water separation; oily water treatment; low quality steam distribution; heat distribution within the reservoir; and drilling and production technology for high temperature applications. Although Canada is one of the largest potential users of such technology, until recently Canadian firms have not been involved in its development. Most work in these areas has been carried out by foreign-controlled companies, with Canada providing the "test bench". Programs funded with Alberta Oil Sands Technology Research Authority (AOSTRA) assistance, mainly in the area of recovery methods, have resulted in the transfer of technology to Canada, since the AOSTRA research agreements provide for AOSTRA control over the use of any processes developed.

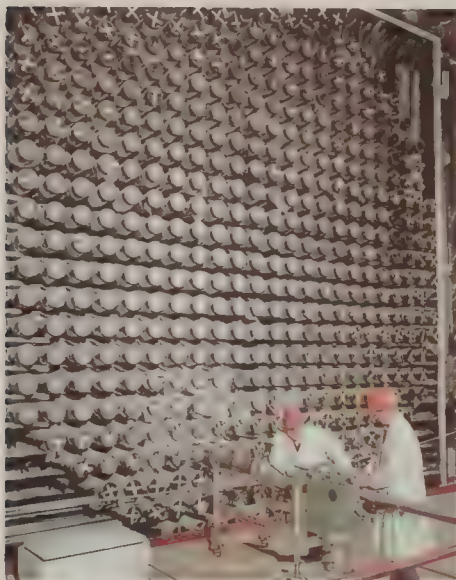
Once bitumen has been extracted from the sands, whether by mining or in-situ methods, it must be upgraded before it can be moved by pipeline to refineries for further processing. Bitumen is a very low gravity viscous material with a high sulphur content. The upgrading to a clean, saleable mixture of naphtha and gas-oil employs processes used world-wide in the refining industry. It is not unreasonable to expect Canadian proficiency to grow as such processes continue to be used, but it is less clear whether there exists a natural Canadian advantage to enhance or develop new ones. Certainly, if there are any areas of high potential, they would be in the coking and hydrogen addition processes, and in sulphur removal and byproduct utilization.

**FRONTIER DEVELOPMENTS** — Exploration for large conventional oil and gas deposits is being carried out predominantly in northern Canada and offshore areas along the east coast. Exploration in west coast areas is also experiencing some renewed activity. Many of the areas are remote and involve the development of routine operating capability in what are among the most challenging environments in the world.

The exploitation of Arctic Island and Beaufort Sea oil and gas deposits will depend upon the ability to provide northern engineering capabilities and regular logistic support to these remote areas. Although modularization of components will allow much fabrication to be carried out in southern Canada, there will remain a need to staff and support production and primary processing operations. Movements to market may be by pipeline or by sea. In either case, substantial new technology development will be needed.

In the case of pipelines, the ability to construct underwater lines through the ice and to protect such systems from ice scour will be critical. With respect to year-round marine operations in ice-covered waters, not only the vessels themselves but related instrumentation, navigation, communications and emergency systems are all obvious areas which need further development. Bathymetry, oceanographics and ice mechanics work will be necessary in support of both pipeline and tanker developments.

Much of the work in the Beaufort Sea and Arctic Islands is in waters which are ice-covered for at least a portion of the year. Ice/sea/structure interaction is an obvious field for Canadian specialization. Subsea production systems are likely to be required in both Beaufort Sea and Arctic Islands applications. To date, technological developments in these fields have had a strong degree of involvement by Canadian firms. Dome Petroleum has built up a world-class marine team of naval architects and engineers. A consortium of Canadian firms operating as the Arctic Pilot Project is developing a liquefied natural gas



Refuelling a nuclear reactor

transportation scheme from the Arctic Islands to southern Canada. Special attention is being given on this project to the development of Canadian technology. As well, Canadian firms sponsoring the Polar Gas Project have developed and tested procedures for laying pipelines through the ice.

Along the east coast of Nova Scotia, Newfoundland, Labrador and Baffin Island as well as throughout much of the Arctic Ocean areas, exploration efforts are aimed at offshore reserves. Many of the areas are in waters deeper than 1500 metres. To date, there has been little "Canadian" technical participation. Because of the nature of the technology and the ownership of the firms involved, there has been a significant tendency to rely on foreign-based parent firms for research and development of systems for exploration and development. Canadian coastal waters provide some of the most challenging deep-water areas in the world and it makes sense for Canadian technology to develop in this area.

#### *Electric Power Generation and Transmission Sector*

Electric power generation and transmission is the area having the highest forecast level of capital investment over the period to the year 2000.

Hydroelectric developments predominate because of proposed major programs in Quebec, Labrador, British Columbia and Manitoba. Proposed nuclear developments are nearly all located in Ontario with thermal plants projected in the prairie provinces and in the Maritimes. Canadian-owned entities, generally provincial government-owned utilities, have a good record of participation in all of these types of projects. In those few areas where technology from outside the country is being used, it is because the Canadian market has been too small to support the development and application of such technology here. However, within this sector generally, Canadian companies have developed capabilities and technology which enable them to participate successfully in world markets. Examples include engineering as well as hydraulic turbines, boilers, and station control computers and simulators. An obvious field for future

Canadian specialization is high voltage direct current transmission technology, since sources of power are often distant from demand and because peak demands are not coincidental in time due to Canada's large east-west geographic spread.

Within the nuclear field, Canada has developed and is marketing the CANDU reactor on an international basis. The concept is based on the use of Canadian uranium and is particularly well suited to the Ontario region where virtually all sites having good potential for hydroelectric development are already in use. Since Ontario has little coal and oil but contains abundant uranium deposits, the provincial government and its agencies have been the strongest proponents of the program and have succeeded in developing nuclear power to provide one-third of the province's electricity requirements.

#### *Mining, Metals and Forest Products Sector*

In the fields of mining, metals and forest products, Canada has abundant raw material resources and indeed, the Task Force's project inventory includes a large number of projects proposed in order to tap them. Mining and material handling and forest harvesting equipment are all used extensively in Canada. Little of the technology can be found here however.

The same is true in metals extraction and forest processing systems. Within the primary metals area, production processes have a high level of Canadian participation, but this technology is one of the few areas where Canada has developed technology around its natural resource advantages.

#### *Other Sectors*

Several other areas could be reviewed in detail. Large demands for technology will occur in the manufacturing of equipment to support development of resource extraction processes. Much potential exists for the use of microbes for ore reduction and oil extraction. Canada will continue to require substantial advances in electronics technology to support overall development. This is particularly true



Chemical research and development

in the fields of communications, data processing and computer control systems.

Secondary and tertiary industrial developments related to the production of petrochemicals and plastic products are forecast to experience high growth over the next several years. Investment activities required to satisfy any or all of the above-mentioned demands may well be of such a scale in some cases to be considered major projects in themselves.

### Constraints

In examining Canadian strengths in the development and application of technology, one finds that industrial sectors such as electric power generation and transmission, steel, transportation and communications have grown up with a high level of participation by Canadian-owned firms. Over the years, technology from abroad has flowed to Canada and been made available to Canadian firms. This has assisted Canadian-owned and other Canadian-based firms to become involved in other advanced technology industries like nuclear power generation, oil and gas production equipment, some aerospace products and health sciences. It is apparent from these developments that technical competence has developed in Canada in sectors where Canadian-owned entities have aggressively applied their efforts or where parent firms of multinational enterprises have transferred technology to their Canadian subsidiaries. It should also be recognized, however, that many of our efforts are not in areas related to our natural resource advantages.

The prevalence in some sectors in Canada of branch plants owned by foreign firms has contributed to the slow development of Canadian technical strength. In fact, 95% of all patents registered in Canada are held by foreign interests. Working largely as fabrication and assembly facilities, Canadian-based branch plants have in the past depended on technology developed elsewhere. Naturally, their R & D efforts were modest at best. Even in cases where new technology has been developed by the Canadian subsidiaries of foreign-owned multinational enterprises, it has frequently

been transferred, in some cases at no cost, to the parent company and to other non-Canadian entities.

The lack of a highly competitive climate in Canada has allowed the survival of too many manufacturers producing the same product lines, with the result that research and development efforts, already modest in international terms (as a percentage of GNP or in dollars per capita), are also spread thinly over a broad spectrum and are thus less effective in any move to grasp potential opportunities. Table 5-1 illustrates the divergence between Canada's efforts and those of other countries.

Since little has been done on a corporate level, R & D in Canada has tended to depend on governments for its financing. Short-term political and economic considerations often involved in government decision making have led to inconsistencies and little long-term stability in the direction of funding, resulting in a scattergun approach. Programs of aid to industry often provide support to firms who have the least financial need and who all too frequently establish R & D programs in Canada more to capture the funds than to strengthen the "Canadian" technology base.

It is interesting to note that the General Agreement on Tariffs and Trade (GATT), in its application to Canada, continues to favour the export of raw materials over finished products. As a result, Canadian exports have tended to be concentrated in low technology areas, whereas Canadian requirements for high technology products are often procured from abroad. Limited and fragmented demands for high technology products in Canada have made it difficult to develop technology in this country. By looking narrowly at short-run costs rather than at broad long-term economic effects, Canada has left much of the technology developed for use here to be controlled from abroad.

In the area of technology, as in others, the uncertainties of Canadian development as a whole and the lack of knowledge about potential specific developments make it difficult for many firms to

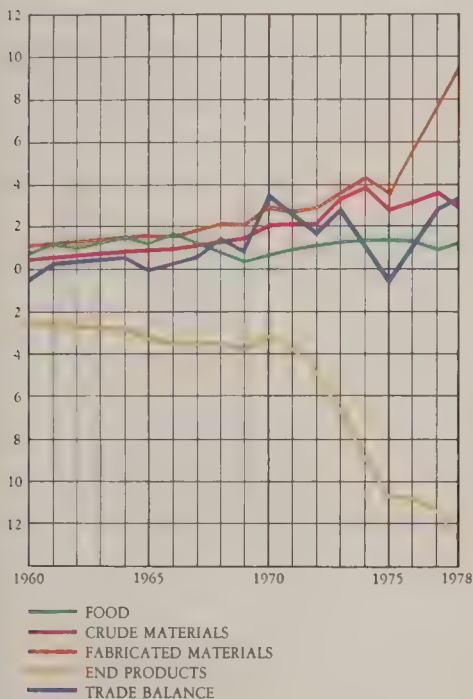
**TABLE 5-1**  
**Gross Expenditure on Research and Development (GERD)/Gross Domestic Product (GDP) Ratios**  
 (per cent)

UNITED STATES GERMANY JAPAN FRANCE SWEDEN CANADA						
2.6	2.0	1.6	1.9	1.5	1.2	1971
2.37	2.14	1.9	1.79	1.51	1.02	1973
2.35	2.16	2.0 (1974)	1.86	1.59	1.0	1975
43	53	65 (1974)	40	57	31	Business Share - 1975

**SOURCE:**

Organization for Economic Co-operation and Development,  
 'Federal Science Activities, 1979-80', MOSST No. ST 21-3, 1980  
 ISBN-0-662-50245-0; p. 75

FIGURE 5-1  
Merchandise Trade Balance



SOURCE: Robinson, H L , "Canada's Crippled Dollar",  
Canadian Institute for Economic Policy;  
1980; p. 57.

justify the investments required for technology development or application. Some assurance that the focus of development will not be radically altered would be a major encouragement to Canadian technology.

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## INDUSTRIAL BASE — MANUFACTURING

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It has been previously noted that there is a high degree of overlap with respect to opportunities and constraints in the areas of technology, MEPC activity and manufacturing. Such overlapping concepts have been discussed under the heading "Technology" and will not be repeated here.

Canadian merchandise trade balances over the last 20 years (Figure 5-1) demonstrate that Canada's end products (manufactured goods) trade performance has deteriorated rapidly beginning in 1970 so that by 1978, the net deficit of \$12 billion was four times what it had been only eight years previously. Food and crude materials continued to reflect the long-term trend of a modest surplus. Exports of semi-finished goods, especially forest products, have cushioned the impact of the deficit in manufactured goods since 1975.

### Opportunities

Major projects are large consumers of manufactured goods. In reviewing the inventory which the Task Force has developed, it can be seen that most of the proposed major Canadian projects are related to primary resource development. Power developments, oil and gas, mining, metals and forest products dominate the proposals. Petrochemicals is the one area where there is a significant level of potential secondary manufacturing investment.

Such developments provide opportunities to establish facilities to produce new products or to expand existing operations. About one half of the investment in energy projects, for example, is for manufactured

goods. Products such as basic steel, pressure vessels, mining equipment, electrical cable and switch gear, offshore platforms and support vessels, instrumentation, power generation and transmission equipment, cement, valves and fittings, just to name a few, will be required.

Canada's natural abundance of raw materials and energy and the extensive developments planned over the period to the year 2000 provide a natural linkage both upstream and downstream of the manufacturing process. This could increase employment in the manufacturing sector and provide the long-term stability to support the development of labour force training and upgrading programs.

Proposed developments will require large quantities of goods. Opportunities exist to explore the development of specifications based on the capabilities of Canadian manufacturers. Consideration of increased product standardization or increased lead times to enable Canadian suppliers to better match their capacity to demands would doubtlessly assist the competitive position of Canadian industry. As well, increased emphasis on overall product life cycle costs (considering the original cost plus operating and maintenance costs, as well as service and reliability factors) could show Canadian suppliers to be more competitive.

### Constraints

Constraining these opportunities are the unique features of the Canadian marketplace. Canada's population is spread out so that concentrated markets are limited and distribution costs are relatively high. Externally, our access to export markets for our finished goods is limited by the GATT bias toward raw materials, and yet strong export markets are one of the basic requirements for expansion of manufacturing production.

To date, Canadian economic growth has been sustained by energy and mineral exports. Secondary manufacturing, especially in mature industries, is being assailed by third world countries where



Installing a pressure vessel at an oil sands plant

production costs are well below Canadian levels. It is unlikely that Canada will be able to maintain its competitiveness in what are generally low technology industries.

Canadian manufacturing is closely linked with U.S. markets. In addition, more than 50% of the flow of manufactured goods between Canada and the U.S. is not between arms-length firms. Foreign-owned, Canadian-based firms have provided many benefits to Canada in the form of technology and capital, but have been reluctant to pursue R & D activities aggressively in Canada and may find export markets restrained by parent firms.

The demands of major projects will entail large quantities and/or large unit sizes. This implies long production runs and associated fabrication time schedules. Canadian industry is more accustomed to short production cycles of different products required to meet a variety of standards. The opportunity to participate in markets which will utilize capacity on a sustained basis can circumvent the historical problems of fragmented markets. But, such participation will not occur unless industry is made aware of the opportunities early enough to plan and take advantage of the situation. There has been a tendency, especially on the part of firms in the less regulated sectors, to resist disclosure of needs for as long as possible for perceived competitive reasons, with the effect that Canadian manufacturers may not have adequate lead time to participate.

Most Canadian manufacturing facilities are of modest size. The Task Force's inventory of major projects contains few manufacturing projects suggesting that Canadian investment continues to concentrate in smaller rather than world-scale facilities.

The fragmented nature of our industrial base lends itself to substantial improvements in efficiency through modernization and rationalization. Given all the opportunities which such efforts could potentially realize, the reluctance to face the difficult decisions such measures entail cannot be deferred much longer.

Part of the reason for small-scale plants is the

tendency to build primarily for domestic rather than export markets. Canadian manufactured goods face direct barriers in the form of tariffs and also pervasive non-tariff barriers when they seek to access foreign markets. As discussed previously, GATT favours the export of raw materials rather than upgraded products from Canada through the application of tariffs which generally increase with additional degrees of upgrading. Many foreign manufacturers receive substantial assistance from their governments in the form of financial aid and protected home markets, compounding the problems of Canadian manufacturers even further.

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## INDUSTRIAL BASE — MEPC CAPABILITY

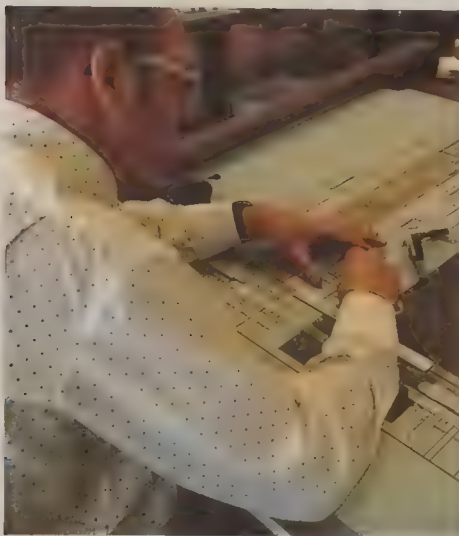
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As noted in the introductory paragraph to the section on technology, there is a high degree of overlap with respect to opportunities and constraints in the areas of technology, MEPC activity and manufacturing. Such overlapping concepts have been discussed under the heading "Technology" and will not be repeated here.

### Opportunities

All projects require the application of MEPC skills as they progress from the conceptual phase through to completion and start-up. Although these skills may be provided by various participants in a major project (e.g., the owner/sponsor, a complete MEPC package contractor, or a subcontractor for one particular component of the MEPC package), it is clear that future Canadian demands for such services are going to be large.

Within Canada, especially in those areas where Canada is traditionally strong and a high level of participation by Canadian-owned firms is found, such as power generation, forestry and mining, these services have been split into component packages. Overall project management has resided largely in the



Design engineering

hands of the owner/sponsor, engineering with consulting organizations, construction with contractors, and procurement wherever it seems to best fit. In recent years, especially in the hydrocarbon area (including processing and petrochemicals), there has been a tendency to rely on a design/build approach where the entire package of EPC skills is sourced through a single entity. The various aspects of project management are sometimes retained in the hands of the owner and sometimes are not.

Without commenting on which approach is preferable, the increasing number of hydrocarbon-related projects is creating a parallel move towards increased usage of the complete MEPC package approach. Canadian engineering and construction organizations have sensed this change and begun to build alliances with other Canadian and/or international firms so that they can offer services in this way. The development of such organizations is important because of the natural linkage and support they provide to the development of technology and manufacturing capability.

Demands for technical, professional, procurement and managerial staff are going to be very large in Canada over the next two decades. A single project such as Cold Lake will involve about 2500 people in these skill areas at its peak level of activity. If an average level of about 1250 over a 4-year period is assumed, this equates to 5000 man-years total or about 750 man-years per billion dollars of investment. Although this is a relatively complex and MEPC skill-intensive project, when related to the Task Force's total inventory projection of in excess of \$400 billion, it is obvious that demands will be large indeed over the next decade and beyond, and will almost certainly fall in the hundreds of thousands of man-years.

The support of such levels of activity implies a need for comprehensive and sophisticated management systems. Such systems are required for cost and schedule control, as well as project management support. Within Canadian firms, project management systems are now becoming available, but they have

rarely been tested on the magnitude of projects which will need to be regularly managed in the future. As a result of limited experience in applying these systems, there is a need to upgrade personnel to an appropriate level of understanding and discipline in the use of systems.

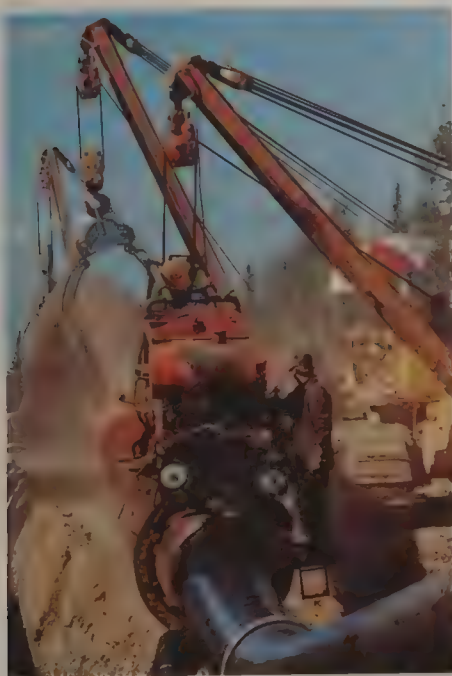
In summary, large and sustained demands in Canada and abroad over the next ten to twenty years will create a substantial market for MEPC services. Canada will represent one of the world's larger markets for such skills. These factors combine to provide a major opportunity for Canadian firms to develop a world-scale capability in design, in process technology development, in project control systems and procedures, and in the management of large projects. In so doing, they will not only improve Canada's balance of payments through decreasing the reliance on imported services, but will also develop a competitive advantage for exporting services elsewhere.

The export of these services could in turn provide significant employment opportunities for Canadians directly and indirectly through potential procurement-generated spin-offs to Canadian manufacturers and other suppliers.

Canadian management of Canadian projects will lead to greater responsibility, career opportunities, confidence and credibility throughout the world. In turn, the entire Canadian industrial potential will be enhanced through the natural linkage to Canadian MEPC organizations.

## Constraints

When assessing the Canadian capability to meet these demands, the qualifications of the personnel required must be considered, in particular their technical education and training and their maturity and applicable experience. Direct and subjective evidence suggests that serious shortfalls will occur. There is simply an inadequate supply in terms of qualified personnel in some sectors and even more serious shortcomings in very large project experience.



Coating and wrapping a large diameter pipeline

Some of Canada's larger corporations have developed substantial in-house capabilities within these areas. However, these teams and their skills are not generally available outside their own organizations in most cases, and are certainly not marketed in any commercial way.

There is a limited training capacity to develop such skills in this country since Canada has traditionally looked abroad, and in particular to the U.S. and Europe, to make up such deficiencies. Such an approach may have been acceptable and practical when Canada had few unutilized manpower resources and when surplus pools of technical, professional and management personnel were available in other parts of the world. Current forecasts of world activity suggest, however, that such surpluses will not be available in the future. While it may indeed be possible to obtain personnel from abroad, they will not likely be any more qualified and may very well be less so than Canadian manpower. What this means is that Canada is going to have to seek ways to better use its existing resources in these areas and to put in place programs that will expand its resources as much as possible.

Canadian involvement in hydrocarbon mega-projects particularly has so far been largely limited to joint venture participation with foreign firms. This has occurred because Canadian firms reportedly do not have the "state-of-the-art" technology or the "experience" or the "systems and procedures" which are available from U.S. and other world-scale entities. To a great extent, this has been true, as Canadian firms have historically developed their management techniques and engineering approaches on smaller or less complex projects.\* Overcoming these shortcomings will be difficult as they involve both lack of depth in manpower resources and limited major project experience in some sectors. Failure to

perform through inadequate staff (in terms of qualifications or experience) or systems will seriously cripple the future potential of the firm offering the services and may jeopardize the economic well-being of the project owner.

In the past, Canadian-based engineering and construction firms were unable to meet many of the massive demands for specialized technology and manpower created by major projects in some sectors. Canada had relatively few such developments and so could not justify developing the capability to handle such demands. Now, however, Canada is about to embark on an unprecedented series of projects. Elsewhere in the world, similar demands for design and construction services are stretching the capability of traditional international suppliers of MEPC services.

These high levels of demand could easily entice an MEPC firm to dedicate an excessively large proportion of its manpower resources to a single major project. If demands then subside, however, the dislocation to a particular MEPC supplier could be severe as the firm concludes a project. MEPC suppliers will therefore have to take care not to become overly dependent on a single major project. One way to avoid such problems is the joint venture approach whereby the capabilities of several firms are aggregated. While attractive in some cases, it does not avoid the problems of integrating systems and personnel into consistent and effective teams.

An unfortunate conundrum has left Canadian capabilities suspect and yet the almost certain gap is going to need to be filled. Now, more than ever before, Canadian firms must be given a fair opportunity to compete to fill the needs of the major projects. The traditional reluctance of the Canadian subsidiaries of foreign-based MNEs to employ Canadian-owned firms on their Canadian projects must be addressed. The reduced risk which they argue is provided by firms with demonstrated experience will in all probability not be provided by firms already stretched to the limit. In any case, Canadian-based firms are generally more familiar

\* As a result, Canada's involvement in process development, pilot testing and conceptual design is low. Further, Canadian firms have not until recently developed cost control, scheduling, financial accounting and construction management systems to the level of sophistication available elsewhere.



Hydroelectric power dam

with local conditions, regulations and standards which may prove to be advantageous to project sponsors.

Particularly over the last decade, Canadian design and construction capabilities have grown extensively. Through international exposure as well as more substantial domestic participation, the ability to manage the complete design and construction effort for major projects is now such that Canadian-owned firms should be afforded the opportunity to carry out leading roles in major projects. The advantage of such participation is the natural linkage to high technology and the associated opportunities for involvement in technological development, design, engineering and marketing, not only in Canada but also abroad. In the past, these linkages have been limited since much Canadian export business has been in the fields of hydroelectric power, transportation and mining where there is limited use of manufactured components.

As well as being constrained by their limited experience outside of the electric power, pulp and paper and mining sectors, for many years Canadian-based, and particularly Canadian-owned, MEPC firms have also tended to be small and narrowly focused. This has resulted in bidding advantages passing to foreign firms either due to the risks perceived by the sponsor or a reluctance by financial institutions to finance the risk. In the hydrocarbon and chemical sectors especially, where the owner/sponsors are often foreign-owned and where their parent organizations have established ties with foreign-based engineering-construction firms, these foreign-owned MEPC organizations have established a major subsidiary presence in Canada. Such relationships are not easily broken because of the confidence and understanding which has grown up. This makes it hard for Canadian-owned firms to gain access to technology and experience related to major projects.

## FINANCE

Although the labour and business members of the Task Force were able to agree on a wide range of issues, this was not possible in the area of major project financing. For this reason, separate labour and business viewpoints on this section are presented.

In reviewing the area of major project financing, it was found that this subject did not easily lend itself to the opportunities/constraints dichotomy around which the other sections of Chapter 5 have been structured. The following labour and business sections on this subject have therefore received a different structural treatment.

## Major Project Financing — Labour Viewpoint

### *Sources of Capital*

The sheer volume of investment in major projects over the next two decades — at least \$300 billion in 1980 terms in the energy sector alone — presents a significant challenge in terms of mobilizing funds and applying them to finance projects in a manner that maximizes Canadian benefits. Savings to finance capital investment come from four sources: personal savings; corporate savings via retained earnings and depreciation allowances; government surpluses; and net capital inflows associated with a current account deficit. The key source of saving in the Canadian economy has been corporate saving — currently accounting for about 60% of all savings. Contrary to popular impression, capital inflows account for a relatively small share of total savings — 8% currently. In a sense, however, this is a deceptive number as an indicator of the degree to which the Canadian economy is dependent on foreign capital. Specifically, a large part of corporate domestic saving is really “foreign” capital in the sense that it is generated internally by foreign-based corporations.

Various sectors rely on different ratios of debt to equity and upon various proportions of internally generated funds and external funding. In the petroleum sector for example, the great majority of funds has been generated internally — with almost exclusive reliance on internal financing in the case of the large foreign-owned multinationals. The electric utilities, on the other hand, have relied primarily on external financing and this has been predominantly in the form of debt, given the high degree of public ownership in this sector.

### *Economic Impacts*

In a macro-economic sense, there is a consensus that capital availability itself will not be a prohibitive problem in the Canadian economy in the near future. Energy investment as a percentage of GNP will increase over the next two decades, but this increase will be largely offset by decreases in other sectors. Housing is a particular example where investment as a percentage of GNP is projected to decline

significantly. This scenario does not preclude financing difficulties in the case of particular projects. Nor does it preclude the need for significant adjustments in the intermediation process of matching savings and investment. However, these adjustments will take place over a considerable period of time, and will largely involve long-term securities (e.g., substituting energy debt securities for mortgages). Overall, then, a relatively smooth response to the financial demands of major projects is foreseen given the innovative capacity of the Canadian financial system. Indeed, the Canadian financial system has already responded to a considerable degree to new demands, e.g., the development of “project financing” techniques in the case of projects such as pipelines.

The above discussion clearly does not agree with the concern that has been expressed by some that the upcoming program of resource-based investment will result in a need to rely on a relatively high rate of foreign capital inflow. This has been the case in past resource booms — particularly in the resource boom of the 1950s — with effects on the Canadian dollar that had negative repercussions on the competitiveness of Canadian industries. But overall economic conditions facing Canada now are quite different than in the 1950s. The financing demands of resource projects are not competing to the same extent with demands in other sectors of the economy. As a result, reliance on foreign savings will not have to serve a “safety valve” function to the same extent. Moreover, the stimulative impact of major projects on the Canadian economy in itself will reinforce the need for less reliance on foreign savings. The contribution of major projects to improved growth and productivity performance in Canada would have two particular beneficial effects - a better overall trade performance which would improve our current account balance, and an improvement in government fiscal positions associated with increased tax revenues based on growing incomes, and reduced expenditures in areas such as unemployment insurance as a result of job creation. The combined impact of these

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developments would be a reduced need for capital inflows.

The previous comments do not preclude the obvious reality that some individual projects will rely to a large or even primary extent on foreign capital. Some of this reliance would be based on traditional patterns rather than the non-availability of financing in Canada at competitive rates. To the extent that foreign financing is required, the use of foreign debt financing versus foreign equity financing is preferable in view of the higher costs to the Canadian economy of the latter.

#### *Role of Government*

Although in an overall sense, capital availability is not seen as a major problem in major projects, labour believes that there are important issues surrounding the source and form of financing that necessitate an important role for government. A first important issue centres on the extent to which government financial assistance takes the form of so-called "tax expenditures" — via accelerated write-offs, depletion allowances, tax credits, etc. — or direct grants. At the present time, the public, as taxpayers, finances a large proportion of resource investment through tax expenditures or tax forgiveness. For the sake of public accountability and the more selective use of public funds to achieve maximum benefits for Canada, labour favours a switch towards the direct grant approach and away from the indirect "tax forgiveness" approach. A major shift in this direction, given current government accounting techniques, would make government expenditures appear much larger, even though in a real sense they would not have changed. Further resistance to the idea would come from corporations who in general prefer subsidies in the hidden form of tax benefits, rather than through outright grants.

A second important issue in terms of the source of financing — particularly in the energy sector — is the pricing issue. Through a combination of tax

incentives and price increases, the petroleum sector in general in Canada has been provided with cash flow to finance investment without having to go to capital markets. In other words, the public, either as taxpayers or consumers, has financed industry expansion. In labour's view, this is a powerful argument for greater public ownership in the sector. But, short of that, labour feels that the isolation of industry investment from capital markets should be ended via the price-setting mechanism. Labour does not believe that the National Energy Program is sufficient in this respect. The price schedule set down there — combined with continued generous tax and grant assistance — creates little increased need for external funding on the part of the dominant foreign-controlled companies. A lower price schedule could not only lead to greater Canadian equity participation in the industry, but as well moderate what now amounts to companies raising funds through a regressive tax on consumers.

## Major Project Financing — Business Viewpoint

The Canadian economy is about to embark on one of the most significant periods of investment spending in its history. In the energy sector alone, planned capital expenditures prior to the year 2000 are expected to exceed \$300 billion (1980 dollars). The direct capital requirements for major projects coupled with capital demands created by the expansion of manufacturing, MEPC and other service industries, as a result of project activity, will form the basis of one of the largest per capita demands for capital in the world.

It is generally acknowledged that capital availability will not pose an insurmountable obstacle to the completion of Canada's planned major projects. Nevertheless, financing the various project-related capital demands presents Canadians with a significant challenge in terms of designing ways to mobilize and apply the vast capital resources involved while at the same time maximizing the associated benefits to the Canadian economy. Not all projects will be financed in the same way and the timing of borrowings together with the experience (and luck) of the sponsors will play a role in determining which projects are realized.

### *Sources of Capital*

Funds to finance Canadian projects have traditionally been drawn from a number of sources including personal savings, retained earnings, depreciation allowances and capital inflows from abroad.

The savings of individual Canadians, whether in the form of deposits, pensions funds or insurance company reserves, accumulate at rates that are among the highest in the world. These savings, together with corporate earnings and depreciation allowances, are likely to continue to be important sources for the financing of major Canadian projects unless government tax policies are radically altered. A potential constraint lies in the continuation and possible growth of government deficits which are financed primarily with borrowings in Canada, thereby reducing the capital available for major projects.

The participation of Canadians in project financing can be especially beneficial, for the project as well as for the investor, if done in the form of equity. The investor will then share in the payout of dividends and reap the growth resulting from reinvested earnings, depreciation allowances and from plant expansion financed with borrowings.

Given the important and positive impact on the Canadian economy in the course of construction and during their operation, major Canadian projects can be a valuable vehicle for the investment of the savings of individuals, including funds in the hands of pension plans both public and private. As of June 1980, private Canadian pension funds had some 30% of their assets invested in Canadian equities. None of the funds generated by the Canada Pension Fund have been invested in equities and this is something that might well be changed.

A study by Ibbotson and Sinquefeld\* for the Financial Analysts Research Foundation in 1979 shows that the real rate of return on equities in the United States over a 52-year period was 6.4% per annum, while on long-term government bonds it was only 0.7%. A March 1981 study by McLeod Young Weir\*\* reflects a similar experience for Canada. This should be reason enough to encourage a greater investment in equities on the part of all Canadians.

It is unlikely that Canadian capital alone will suffice to finance the major projects of the next twenty years. Imports of foreign capital will make up for any shortfall, permitting the realization of projects that might otherwise be delayed or cancelled. Imported debt capital, unless in Canadian dollars which are seldom available, involves an exchange risk. Given the strength of Canada's resource base, including the possibility of increased exports of energy and other

\* Ibbotson, R.G. and Sinquefeld, R.A., "Stocks, Bonds, Bills and Inflation . . . Historical Returns (1926-1978)"; Financial Analysts Research Foundation; Charlottesville, Virginia, 1979.

\*\* McLeod Young Weir Limited (B. Bolin and P. Martin); "Comparative Investment Returns — 1980 Update — Equities, Bonds, Mortgages, Short-term Paper"; March 10, 1981.

products, and the likelihood of improved economic performance in the years ahead, the risks of borrowing in U.S. dollars seem to be at an acceptable level.

Past borrowings in currencies like the Swiss franc and the deutsche mark have often proved unduly expensive but some sponsors may find it appropriate to take such risks, especially if some of their project's output will be sold in world markets.

The U.S. capital market is a huge one and likely to supply most of the foreign funds required for major projects. A further source of U.S. dollars is the Eurodollar market including syndicated bank loans. The latter are usually at floating interest rates but the availability is almost without limit and able to satisfy any needs that may remain after exhausting Canadian sources.

Two reasons make borrowing the preferable source of foreign capital. In the first place, the cost of funds is fixed and, in the long run, is less than the cost of equity financing. In the second place, such borrowings do not involve a dilution of Canadian ownership of resources, an important consideration in the eyes of many Canadians.

#### *Economic Impacts*

The main impact of the building and operation of major Canadian project facilities will be on overall Canadian economic performance. The increases in investment will translate directly into increased job opportunities, a higher standard of living, increased savings and government revenues, and, eventually, a reduced need for imported capital.

Any decline in capital inflows from abroad resulting from the increased use of Canadian financial resources (brought about by a reduction in Canadian capital outflows as a result of government tax incentives) will have an adverse effect on the balance of payments and place some downward pressure on the dollar. A weaker Canadian dollar, however, when coupled with government and industry drives to encourage the development of domestic sources of goods and services, will help Canadian firms increase their

penetration of international markets. The resulting increase in exports will provide a stimulus to Canadian exporters and offer a base on which to build improved long-term job opportunities and a higher Canadian standard of living.

These positive effects may be further aided by adopting an oil pricing policy that values domestic oil production according to its value from alternative sources or in alternative markets. The effects of such a policy would include the channelling of increased retained earnings into major projects, a consequent reduction in the Canadian reliance on foreign capital, and a reduced federal deficit (mainly because of reduced oil subsidies and higher tax collections). All of these effects would reduce government demands on Canadian capital markets which would then be able to satisfy a greater proportion of the financing required by major projects.

#### *Role of Government*

The strategic importance of individual projects as well as their cumulative importance to Canada is easily recognized. Given the highly mobile nature of capital, both domestic and foreign, greater certainty in the socio-political environment is an important prerequisite to successful project financing. In this regard, the government has a role to play in ensuring that policy statements are clearly enunciated.

One of the most important roles for government involves the expedition of decisions related to major projects as well as facilitating, to the extent feasible, their financing by Canadians or Canadian sources. Just as it has encouraged the Canadian propensity to save through various tax incentives, the government should further facilitate, through similar means, investments by individual Canadians, thereby encouraging domestic ownership and control of key economic sectors.

The current volatility of interest rates in U.S. and Canadian financial markets, due in a large measure to high levels of price inflation, has created an environment in which it is increasingly difficult to obtain long-term fixed rate financing. Loans are often

being reduced to five-year terms or less with the largest sums being made available on a floating rate basis. Uncertainties surrounding the cost of long-term financing have made cost forecasts less accurate and financing more difficult for major projects.

To ensure that Canada realizes its long-term potential, there is an urgent need for a resolution of the federal and provincial governments' dispute over the division of resource responsibilities and the allocation of the proceeds resulting from their development. The increased level of economic and political certainty which would accompany such a decision would greatly improve the Canadian investment environment.

Government initiatives aimed at encouraging Canadian resource development through tax regulations and direct, impartially administered grants are other ways in which government can be positively involved in financing major projects.

One measure which is particularly useful to encourage or speed up investment in plant and equipment is the use of accelerated depreciation, which permits a taxpayer to amortize the cost of some investments (or a part of such costs) over a shorter period than would otherwise be used. It is important to recognize that the taxpayer is not getting "something for nothing." He makes an investment of capital with his own or borrowed funds, at a time or in a manner that the government considers desirable. Such investments produce income and taxes are paid thereon. For the tax collector, there is a deferral of income but no reduction in amount over the long run. The funds not paid immediately to the tax collector are usually reinvested at a much earlier date than would otherwise be the case, with a consequent advance in the date on which new profits become available for sharing by the sponsor and the tax man.

Another measure to speed up investment is the use of government grants. These should be made without strings if they permit the carrying out of a project that is clearly in the public interest but which might be unduly delayed if assistance were not provided.



Over 40% of the major projects identified on a national basis in the forest products sector are located in the province of British Columbia



Previous chapters of this report have outlined projects and their requirements as they are currently identified by major project sponsors. These requirements have been compared to the anticipated Canadian capability to meet them in order to identify opportunities for expanding the industrial and regional benefits which Canada may achieve through major projects in the future. The report has also described constraints which may act to reduce or otherwise inhibit the realization of benefits. In this chapter, the Task Force puts forward recommendations for actions which it believes will help overcome these constraining factors. The final chapter of the report discusses how these recommendations might best be implemented.

The Task Force recognizes the high level of interaction between the various components of the economic base and the setting in which they are placed. It is this interdependence which determines the level of the net benefits which accrue to Canada as a result of major projects or any other economic activity.

The Task Force recommendations are grouped under three general headings: information and planning; major project policy environment; and economic base factors. Information and planning represent the highest level of need, and these aspects are therefore dealt with in the first group of recommendations. Without adequate and timely information, it is not possible to meaningfully assess the opportunities available, to reflect intelligently upon potential problem areas, or to effectively plan actions through which benefits can be increased.

The setting or environment within which projects are being planned and undertaken must be conducive to the maximization of industrial and regional benefits. The second grouping of recommendations therefore deals with policy-related aspects and covers four major topics: Canadian participation, ownership and control; regional equity; government legislation and administrative practice; and timing of major projects.

The final group of recommendations is more detailed and relates to the strengthening of certain

components of Canada's economic base, that is, the country's manpower, technological, industrial and financial resources. The effective development and use of these resources will play a very large direct role in the maximization of Canadian industrial and regional benefits from major projects.

## INFORMATION AND PLANNING

### Availability and Use of Information

In the most fundamental terms, planning for any economic activity depends upon the timely availability and effective use of pertinent information. This is particularly relevant in the broad context of seeking to maximize Canadian industrial and regional benefits arising from major projects.

Industrial expansion and the associated development of employment opportunities are highly dependent on the early recognition and exploitation of opportunities. There is a clear need for comprehensive information in an aggregated form concerning the requirements that major projects will generate for manpower, goods, services and financing, and the ability of the Canadian economy to meet those needs. In turn, this information can be used to increase the opportunities for Canadian entities to evolve their capabilities, through the development of special programs, plants and other facilities in areas where there is significant potential to increase the level of Canadian participation.

Throughout its work, the Major Projects Task Force regularly encountered a lack of pertinent and up-to-date information regarding the detailed demands for and supply of services, materials, equipment, financing and labour. This made the Task Force's work difficult but, more important, it highlighted difficulties experienced by suppliers, financial institutions, educators, labour, governments and others as they attempt to assess such data on a regular basis and formulate plans based on it.

The Task Force found that although there may in

many cases be substantial data prepared, there is frequently a reluctance to make it publicly available. This situation generally arises from concerns about being held accountable for the accuracy of what may be very preliminary information, or due to a belief by the participant that disclosure may compromise the firm's competitive position. In order to help allay these concerns to some degree, it will be necessary, in any information collection exercise, for there to be a clear statement of: the content and level of detail of information required; specification of what the information will be used for, how it will be aggregated and to whom it will be provided; and provision for the supplier of the information to indicate its status (i.e., preliminary, final, estimated, actual, etc.).

In other cases, the Task Force found that project participants do not have particularly extensive, detailed, up-to-date or accurate project-related demand and supply information. This situation may be explained at least in part by the fact that such information has not been considered so important in the past. Since the various demands in question have previously been adequately met from within Canada due to lower levels of demand or, alternatively, because imports of goods, services, financing and manpower have traditionally been available to supplement Canadian supply sources, the capability of the Canadian supply community has not necessarily been considered a critical factor in project planning and therefore detailed demand and supply information has not been developed.

Finally, the Task Force found that data prepared by project participants are often incompatible or inconsistent. At times, this occurs within a particular project, but it is more often the case between various projects. Classifications, methodologies, areas assessed and assumptions used vary widely. Such variations make meaningful aggregations difficult to carry out, and such aggregations as are completed may be misleading.

In the past, such information deficiencies were not as significant as they are certain to be in the future.

This conclusion is based in part on the following three factors:

(a) Future demands for goods, services, financing and labour on major Canadian projects will reach unprecedented levels, both on individual projects and in aggregate.

(b) Major project activity in other parts of the world will be substantial and will attract goods, services, financing and perhaps manpower which in the past might have been available for use in Canada.

(c) Canada's economy is currently characterized by high unemployment and underutilized industrial capacity.

These factors, among others, will make the past and present lack of information unacceptable in the future, as any plans to expand capabilities must be based on a knowledge of what the demands for those capabilities are likely to be. Generating the various kinds of relevant data is only the first step. For information to be meaningful and effectively used, it must be aggregated at an appropriate level or levels and made available to those who require it for planning purposes. Only through this process can potential opportunities and problems be identified and action taken.

Recognizing therefore the importance of continuously upgraded information and planning to the objective of maximizing Canadian industrial and regional benefits from major projects, the Major Projects Task Force makes the following recommendation:

**Recommendation:** A Major Projects Assessment Agency, as described in Chapter 7, should be established with objectives and responsibilities which include information gathering, aggregation and dissemination.

## POLICY ENVIRONMENT

The recommendations in this section concern themselves with the policy environment required for

the maximization of industrial and regional benefits from major projects. A common theme of many of these recommendations is the need for positive action on the parts of the federal and provincial governments.

Recommendations grouped under this heading deal with:

- Canadian participation, ownership and control;
- regional equity;
- government legislation and administrative practice;
- timing of major projects.

### Canadian Participation, Ownership and Control

The maximization of the level of participation by Canadians in all phases of major project activity in Canada is an issue of prime importance. Any such maximization necessarily implies the development of Canadian manpower, technological, industrial and financial resources within an environment that will promote their optimum use. In this connection, the Task Force has found that in some cases the participation of foreign-owned MNEs in key actor roles in major projects may be more likely to give rise to a shortfall in benefits than would be the case if a Canadian-owned firm had played the same role.

The question of ownership of the projects themselves and of their participants is also of concern with respect to the long-term outflow of dividend payments and the resulting effect on Canada's international balance of payments position.

With the above objectives and concerns in mind, the Task Force makes the following recommendations:

**Recommendation:** Every reasonable effort should be made to ensure that Canadians have access to all managerial, professional, technical, skilled trades and general labour positions relevant to the planning, engineering, construction and eventual operation of major projects.

**Recommendation:** Recognizing that potential participants in major projects have to be assessed on a firm-by-firm basis in order to determine the contribution they will make to the maximization of Canadian industrial and regional benefits, Canadian-owned firms or, as a second priority, other Canadian-based firms, should be selected to play key actor roles (including owner/sponsors, MEPC firms, and suppliers and sub-suppliers of goods and services) in future major Canadian projects.

In cases where no Canadian-owned or other Canadian-based firm is deemed to be capable of undertaking the work associated with a particular key actor role in a major project, work should be packaged in ways that allow participation by these types of firms in accordance with the contribution they will make to the maximization of Canadian industrial and regional benefits.

**Recommendation:** Project financiers should not, when offering financial terms, discriminate against projects with a high degree of participation by Canadian-owned firms in key actor roles.

**Recommendation:** With respect to improving Canada's balance of payments position, major project participants (including owner/sponsors, MEPC firms, and suppliers and sub-suppliers of goods and services) should afford Canadians the maximum opportunity to participate in the equity ownership of the projects themselves and of their firms.

### Regional Equity

Canada has been built on the concept of sharing and cooperation. Through the course of the country's history, the advantaged regions of Canada have aided the less advantaged ones. Major project development in Canada must provide all regions with the opportunity to participate directly so much as possible, but also to share the advantages of the wealth which will flow indirectly from the projects.

The fostering of greater equity among Canada's regions has been a long-standing goal of Canadian federal and provincial governments, and certain

actions have been taken which have been felt to contribute to the attainment of this goal. In particular, some provincial governments have established provincial and/or regional sourcing requirements with respect to manpower, goods and services. While recognizing that benefits sometimes accrue from regional sourcing preferences, it is the belief of the Major Projects Task Force that progress towards regional equity is not enhanced in the long term by the erection of arbitrary barriers to the flow of manpower, goods and services within the country.

With the objective of increasing long-term regional equity within Canada, the Task Force makes the following recommendations:

**Recommendation:** Where locational choices are not limited to a particular site, major projects and/or their associated support industries should be encouraged, as a matter of public policy, to locate in less advantaged regions.

**Recommendation:** Special efforts should be made to source labour, goods and services for major projects wherever feasible from less advantaged regions of the country.

**Recommendation:** Federal and provincial governments should jointly establish criteria for judging cases where regional sourcing preferences, relative to manpower, goods and services, are likely to be supportive of broader regional equity objectives in a long-term sense. In all other cases, arbitrary barriers to the flow of manpower, goods and services should be eliminated.

## Legislation and Administrative Practice

The Major Projects Task Force has found deficiencies and inconsistencies in the area of federal and provincial legislation and administrative practice which work against the maximization of Canadian industrial and regional benefits arising from major projects. The business members of the Task Force believe that such inconsistencies create a general

atmosphere of uncertainty concerning the "rules of the game".

With the objective of improved government legislation and administrative practice, the Task Force makes the following recommendations:

**Recommendation:** Governments at both levels should undertake extensive reviews of the regulatory process in order to eliminate duplication and avoid unnecessary delays in the progress of major projects.

**Recommendation:** A clear set of guidelines with respect to expected behaviour in the area of Canadian industrial and regional benefits should be developed and applied to all key actors in major projects (including owner/sponsors, MEPC firms, suppliers of goods and services, financiers and labour unions, as applicable). These guidelines should extend to both the public and private sectors, as well as to both Canadian-owned and foreign-owned firms. Major project participants should develop written plans outlining how they intend to conform with these guidelines. The development of the guidelines and monitoring of the project participants' conformance with their plans should be the responsibility of the Major Projects Assessment Agency described in Chapter 7. The labour members of the Task Force believe that government should ensure conformance with these guidelines through the use of legislative, regulatory and financial powers.

## Timing of Major Projects

There is a strong possibility that benefits could be lost because of the simultaneous peaking of demands for manpower, goods and services arising from several major projects proceeding at the same time. It follows that actions to smooth out the level of demands for inputs to major projects will result in the capture of additional benefits to Canada.

**Recommendation:** Business, labour and government should cooperate to solve potential problem areas, including those related to the unacceptable peaking of major project demands, identified through the activities of the Major Projects Assessment Agency

described in Chapter 7. The labour members of the Task Force believe that government, at both levels, should also use regulatory and legislative powers to ensure as far as possible that the demands of major projects are timed to attain optimum levels of Canadian benefits in terms of stable employment and efficient utilization of Canadian industrial capacity.

## ECONOMIC BASE

The final group of Task Force recommendations relates specifically to the strengthening of the manpower, technological, industrial and financial components of the economic base.

### Employment and Manpower

Major project activity will provide, both directly and indirectly, expanded employment opportunities for Canadians. To a large extent, the major project labour requirements will be heavily weighted towards specialized skills. Special efforts will be required if the necessary skilled workers are to be provided in sufficient numbers from Canadian sources. Specific actions required include those dealing with the problems of inadequate planning, training and utilization of manpower, the relative immobility of labour between Canada's regions, and special labour relations considerations within the major project environment. The Major Projects Task Force has developed the following recommendations to deal with these problems related to the manpower base.

#### *Training and Utilization of Manpower*

An improved capability and commitment to train Canadians for the specific employment opportunities arising from major projects is essential if benefits to Canada are to be maximized. This will require a greater emphasis on the creation of on-the-job training facilities, a more standardized and coordinated trade certification process, and the more effective use of occupationally disadvantaged workers.

**Recommendation:** There should be a shift in emphasis in training programs towards increased on-the-job training. This should involve a reallocation of

spending priorities for government training programs such as the Canada Manpower Training Program. Action will also be required to ensure the expansion of on-the-job training by industry. It is proposed that a levy/grant system be introduced on an experimental and selective, sectoral basis to impose a payroll training tax levy on employers in those industries where training-related shortages are known to exist. The funds would be distributed to those employers who actually institute approved training programs.

**Recommendation:** The attractiveness of trades careers and of non-traditional career patterns should be emphasized through a combined program of extensive advertising and career counselling in high schools.

**Recommendation:** Provincial certification programs and licencing requirements should be more fully standardized and coordinated on a national basis through consultation among the provinces. Business and labour organizations should continue to facilitate any initiatives taken in this regard.

**Recommendation:** Academic institutions, industry and organized labour must work together more closely to help ensure the relevancy of academic programs. Increased information flows will assist in any reviews undertaken in this regard.

**Recommendation:** Immigration should not be relied upon, other than in exceptional cases, to meet future Canadian manpower requirements. Government should issue temporary employment authorizations only when it has been clearly established that such authorizations will not displace qualified Canadians and only when specific commitments are made with respect to training a Canadian replacement for the foreign worker (succession plan). Furthermore, employment authorizations should only be issued to those individuals who will be working for firms which can demonstrate a history of, and make undertakings related to, effective manpower planning, support for a "Canadians first" policy, training, and support for affirmative action initiatives.

**Recommendation:** Special programs should be developed by government, business and labour to further the employment of the occupationally disadvantaged. Particular effort should be directed towards the employment of women, the disabled, natives and workers from high unemployment regions. The labour members of the Task Force believe that government should use its leverage via procurement, grants to industry, etc., to guarantee progress in this direction.

#### *Labour Mobility*

Barriers to the mobility of labour between regions limit the effective utilization of Canadian manpower resources. Mobility can be improved through a combined program of eliminating arbitrary barriers, increasing expenditures on relocation assistance, and improving the flow of information about job opportunities.

**Recommendation:** Barriers to the mobility of labour resulting from varying apprenticeship standards and inadequate pension vesting provisions should be eliminated wherever possible. The elimination of interprovincial barriers to mobility based on arbitrary local preferences is also strongly recommended in cases where such preferences do not provide long-term benefits to Canadians.

**Recommendation:** Financial assistance available for worker mobility should be improved and expanded. In this regard, major project owner/sponsors and MEPC firms should provide financial assistance for the relocation of workers from other regions to major project sites. Government programs such as the Canada Manpower Mobility Program should also be improved and expanded.

#### *Labour Relations*

Major projects provide opportunities for management and labour to cooperate in the creation of mutually advantageous industrial relations environments at the project level. The very nature of these projects is such that they should demonstrate leadership in labour practices.

Canada's industrial relations system has evolved to a level of relative sophistication and maturity. The right of workers to organize and engage in collective bargaining is a democratic principle reflected in the laws of Canada and echoed in long-established international labour standards to which Canada is a signatory. It is vital to the optimum realization of benefits from major projects that such rights be recognized by major project sponsors and their subcontractors.

**Recommendation:** Major project owner/sponsors and MEPC firms should follow good labour practices, including recognizing both the spirit and the letter of workers' legal right to organize, without interference by employers, and bargain collectively. In order to ensure the continuing viability of the bargaining unit, governments in all jurisdictions should implement the practice of mandatory dues check-off.

**Recommendation:** Labour issues should be resolved by labour and management officials who are resident in Canada and who have the understanding and authority to bring industrial relations issues to final resolution.

**Recommendation:** Governments should enact legislation which permits the establishment of project agreements of limited duration in cases where employees have freely chosen their bargaining agents and where bargaining agents and employers have determined that such an agreement is appropriate.

## **Technology**

Major projects being planned and constructed in Canada before the end of the century will have very large requirements for various kinds of technologies. Opportunities therefore now exist to support particular technological developments within this country based on these domestic market demands, while looking as well at export potential. Such Canadian technological developments will be necessary if Canada is to improve or even maintain its competitive position in the world. In this regard, technological research and development is a key contributor to the ability of Canadian firms to

compete effectively as suppliers to major projects within Canada and in export markets, and the importance of R & D must be recognized. Although government support is important in this respect, project sponsors have the prime responsibility for stimulating Canadian R & D activity in relation to their individual requirements.

The Major Projects Task Force believes that efforts to increase the development of technology should receive high priority. At the same time, it is recognized that new technology must be implemented in an orderly fashion and that every effort should be made to minimize any adverse effects on labour.

**Recommendation:** Increased initiatives are required on the parts of governments and industry to develop in Canada the technology required for major Canadian projects. In this regard, governments should consider selective research and development contracts and other incentives designed to prepare Canadian suppliers for identified major project opportunities. For example, consideration should be given to establishing a product development fund to finance proto-types and encourage the creation of new world-competitive products and services.

**Recommendation:** The Government of Canada should maintain effective surveillance of imports of capital equipment to ensure that violations of the GATT and the Multilateral Trade Negotiations codes with respect to dumping, subsidies and other prohibited practices do not occur:

- (a) by constituting a Capital Goods Task Force within Revenue Canada with the specialized skills necessary to evaluate such imports; and
- (b) by including within the proposed new Special Import Measures Act specific provisions directed against dumping and subsidization of capital equipment.

**Recommendation:** Technology developed in Canada on major Canadian projects should be beneficially owned and controlled by Canadians. Where

technology is purchased from outside the country, it should be acquired so as to ensure its ultimate beneficial ownership and control by Canadians wherever possible.

**Recommendation:** In cases where technological changes have the potential to significantly alter the terms and conditions of employment, the disruptive impact of such changes on labour should be mitigated through negotiation with employee representatives.

## Industrial Base — Manufacturing and MEPC Capability

Significant development will be required in many of Canada's industrial sectors in order to meet the demands of major Canadian projects over the period to the year 2000. Manufactured inputs will be required, as will various services including project management, engineering, procurement and construction services. The following recommendations are put forward by the Major Projects Task Force to assist in the development of the required manufacturing and service capability in Canada.

### *Procurement Policies and Programs*

The Task Force strongly believes that procurement policies and programs can be effectively used, both in the public and private sectors, to maximize Canadian industrial and regional benefits from major projects and to thereby increase Canadian industrial capability. In this regard, the Task Force makes the following recommendations:

**Recommendation:** In consultation with appropriate governments, major project owner/sponsors and MEPC contractors, both in the public and private sectors, should establish written procurement policies and undertake programs that will contribute to the objective of maximizing Canadian industrial and regional benefits. The contents of and adherence to such policies and programs should be reviewed by the Major Projects Assessment Agency described in Chapter 7.

**Recommendation:** Recognizing that potential suppliers to major projects have to be assessed on a firm by firm basis in order to determine the contribution they will make to the maximization of Canadian industrial and regional benefits, major project participants, both in the public and private sectors, should give preference in their procurement policies to suppliers of goods and services (including project management, engineering, procurement and construction services) in the following order of priority: 1) Canadian-owned firms; 2) Canadian-based firms; 3) others.

**Business Recommendation:** Major project participants, both in the public and private sectors, *should be encouraged to pay* premiums totalling up to a maximum of 3% of total project cost for the development of and purchases from generally competitive Canadian-based suppliers. Premiums should be allotted among Canadian-based firms in cases where it will contribute to the creation of new long-term industrial capability in Canada that can operate on a generally competitive basis. A discussion of some of the long-term benefits to Canada from the payment of such premiums is contained in Appendix D.

**Labour Recommendation:** Major project participants, both in the public and private sectors, *should pay* premiums totalling up to a maximum of 3% of total project cost for the development of and purchases from generally competitive Canadian-based suppliers. Premiums should be allotted among Canadian-based firms in cases where it will contribute to the creation of new long-term industrial capability in Canada that can operate on a generally competitive basis. A discussion of some of the long-term benefits to Canada from the payment of such premiums is contained in Appendix D.

**Recommendation:** In cases where a Canadian-based firm that is a potential supplier can be made competitive in terms of price and long-term capability with the technical assistance of an owner/sponsor, the owner/sponsor should make every reasonable effort to provide the assistance required.

### *Standardization of Requirements*

Many of the industrial products required by major projects are highly specialized and the requirements from a single major project may be too small to allow efficient production in Canada. This problem may be compounded by design standards which are unnecessarily diverse.

**Recommendation:** In both the public and private sectors, project owner/sponsors and MEPC firms should, so far as possible, utilize design standards which provide the maximum opportunity for Canadian suppliers to compete effectively.

### *Work Packaging*

It is often the case that the timing of demands, the large volume and/or the complex scope of work demanded in single orders precludes otherwise competitive Canadian-owned and other Canadian-based firms from supplying goods and services (including project management, engineering, procurement and construction services) to major projects.

**Recommendation:** Major project participants, both in the public and private sectors, should make every effort to facilitate the participation of Canadian-owned suppliers of goods and services (including project management, engineering, procurement and construction services) in major projects. Where no Canadian-owned firm is capable of undertaking all of the work associated with a particular aspect of a major project, work should be packaged in terms of size, scope and timing in a way that allows the maximum participation by Canadian-owned firms and, as a second priority, by other Canadian-based firms. Major project participants should encourage the participation of these firms in a manner that provides them with the experience base necessary to meet more extensive portions of major project demands in the future.

### *Aggregation of Supply Capability*

The participation of Canadian-based suppliers of goods and services (including project management,

engineering, procurement and construction services) in major projects is often limited by the inability of small suppliers to bid on very large orders. As a result, orders may go to large foreign suppliers even though the combined capacity of several smaller Canadian-based firms would have been adequate to competitively meet the demands.

**Recommendation:** Canadian-based suppliers of goods and services (including project management, engineering, procurement and construction services) should form joint ventures or consortia, merge or take whatever other steps are necessary in order to take advantage of major project opportunities.

### *Foreign Trade*

Canadian industrial and regional benefits resulting from Canadian participation in international major projects can be substantially increased through input and involvement on the part of governments.

**Recommendation:** Governments should be prepared to offer assistance to Canadian-based suppliers of goods and services where this is necessary to compensate for advantages enjoyed by foreign competitors as a result of assistance from their governments.

**Recommendation:** Governments should assist in negotiating Canadian participation in foreign work connected with the acquisition of Canadian technology by other countries. In addition, offsets should be negotiated with respect to major Canadian import purchases in order to help maximize the utilization of Canadian industrial capability.

### *Industrial Structure*

The ability of Canadian industry to supply major project requirements will be enhanced by the development of specific sectors of the economy. In this regard, Canada's current industrial structure is characterized by an insufficiently developed processing and secondary manufacturing sector which cannot fully capitalize on opportunities presented by projects related to natural resource upgrading. This is particularly true in manufacturing facilities

established in Canada under the auspices of foreign-owned multinational enterprises, since Canadian operations frequently have corporate responsibility limited to serving the Canadian market. The Canadian small business sector has also not developed to the same extent as in other industrialized countries.

**Recommendation:** Government policies should ensure that business enterprises take advantage of downstream upgrading opportunities associated with natural resource projects in order to develop Canadian processing and secondary manufacturing capability.

**Recommendation:** Governments and industry should ensure that their procurement policies encourage the participation of small and medium-sized enterprises.

**Recommendation:** Governments should ensure that the Canadian operations of foreign-owned multinational enterprises are assigned the corporate responsibility of pursuing export trade opportunities. One approach to this is the designation of world product mandates for types of goods developed and manufactured in Canada.

### *Utilization of Developed MEPC Capability*

In some cases, owner/sponsors of major projects choose to develop in-house project management, engineering, procurement and construction capability rather than utilize the services of a project MEPC contractor. To the extent that such MEPC capability is then not fully utilized on a continuing basis within the firm, a shortfall in Canadian industrial benefits can result if such capability is not marketed outside the firm.

**Recommendation:** Major project owner/sponsors who develop substantial in-house expertise should market any excess capability.

### *Finance*

The volume of investment in major projects presents a major task in mobilizing funds and applying them in a manner that maximizes benefits to Canada. It is the Task Force's conclusion that capital availability

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per se will not be a difficult problem for the program of investment in major projects over the period to the year 2000. However, the sourcing and form that such funding takes are important factors in achieving maximum benefits from these projects.

**Recommendation:** As with other inputs into major project investments (such as machinery, equipment, labour, etc.), project owner/sponsors should first pursue Canadian sources in seeking out needed project financing.

**Recommendation:** Where foreign financing is utilized, projects should be encouraged to amortize such financing through the export of some of their production to avoid increasing the balance of payments deficit associated with debt servicing.

**Recommendation:** In terms of foreign sourcing of capital, preference should be given to foreign debt rather than equity, in view of the higher long-run cost of the latter particularly in relation to resource industries.

**Labour Recommendation:** Current tax measures with the avowed purpose of stimulating savings and investment should be reviewed with a view to transforming a large part of them in directions that would more clearly stimulate investment — e.g., to use the revenue now foregone to finance selective direct grant assistance to investment.

**Labour Recommendation:** In terms of the choice between direct grants versus tax expenditures, public policy should favour the former versus the latter in that grants are more visible and accountable. Moreover, in return for grant assistance, government should acquire an equity position.

**Labour Recommendation:** In exchange for special financing provisions, government should enter into "project agreements" with corporations which would make financial assistance conditional on performance in relation to the pursuit of Canadian benefits.

**Labour Recommendation:** The large oil and gas companies should be required to be more dependent

on external financing rather than internal financing through the price mechanism. The main vehicle to achieve this would be a moderation of projected domestic energy prices which involve a regressive tax on consumers.

**Business Recommendation:** Where major projects are considered to be "in the national interest", government loan guarantees should be used where necessary to ensure the project actually proceeds. Where such guarantees actually result in an investment by government, then the project should provide a debt or equity instrument to government. If an investment by government is not required, there should be no cost to the project.

**Business Recommendation:** The government should implement measures that will stimulate increased Canadian investment in companies sponsoring the construction of major projects. One such measure would be the introduction of tax provisions similar to those of the Quebec Stock Savings Plan.

**Business Recommendation:** Continued high levels of government deficit spending can significantly affect the level of domestic capital available for investment in Canada. Governments must therefore be prepared to explicitly address the trade-offs between investment in services as opposed to major projects and manage their spending programs accordingly.

**Business Recommendation:** Current tax measures aimed at stimulating savings and investment (RRSPs, investment tax credits, accelerated depletion, etc.) should be continued to sustain high Canadian levels of savings and investment.

**Business Recommendation:** Direct investment by governments in major projects should not be accorded greater rights and privileges than any other investor.



The vast expanses of the Yukon and Northwest Territories hold significant potential in terms of untapped mineral and other natural resources



## MAJOR PROJECTS ASSESSMENT AGENCY

The Major Projects Task Force recommends the formation of a Major Projects Assessment Agency.

In approving this method for the implementation of the Task Force recommendations, a number of primary concerns were acknowledged:

- the vehicle of implementation must provide all governments with the opportunity to freely share information within Canada, with the understanding that the provincial jurisdiction is acknowledged and safeguarded;
- major project sponsors must be assured that competitive proprietary information will also be safeguarded.

Within Canada's mixed economy, it is recognized that business and labour have a major and continuing role to play. But governments have a role to play in encouraging and ensuring that the knowledge and expertise in the business and labour communities are utilized in the interest of Canadians. In addition, governments have the final responsibility for implementing and legislating policies as the holders of the public interest for Canadians. The role of the Agency will be to supplement this process by adding the input of business and labour in a more cohesive manner.

A primary objective in approving the recommendations and implementation vehicle included in this report is to significantly assist major project sponsors in their search for the available and competent Canadian expertise required for major projects or to enable the creation of the required expertise.

In order to allow the Major Projects Assessment Agency to carry out this task, major project participants, in both the public and private sectors, should be required to provide pertinent project-related information to the Agency. Information

should include project schedule and capital cost information as well as detailed data on requirements for goods, services and manpower.

The Task Force recognizes that without the federal and provincial governments' endorsement of and cooperation with the implementation proposal, the work of the Task Force will largely be ignored. If it should be ignored, the potential positive results of further consultative processes in the future will be jeopardized because business and labour may choose not to participate.

The Task Force concludes its work with the hope that all participants in major projects carried out in Canada (including project sponsors, suppliers, labour and governments) are anxious to maximize industrial and regional benefits to Canada from such projects and are willing to participate together towards a strengthened Canada.

### Objectives and Responsibilities

The general objectives of the proposed Major Projects Assessment Agency will be:

- To promote, forecast, monitor and report publicly on the maximization of Canadian industrial and regional benefits achieved from the planning and construction of all major Canadian projects.
- To provide advice and recommendations to Canada's governments, labour and business on any matters concerned with maximizing the Canadian regional and industrial benefits arising from the planning and execution of major Canadian projects.
- To make representations on the above matters as they relate to project timing, authorizations and government financial support.

It is not the objective of the Task Force to equip the Assessment Agency with any authority which may enable it to veto or schedule major projects; however, the Agency may make recommendations which could favourably effect an increase in the manufacturing, construction, labour utilization and other benefits

accruing to Canada, including recommendations regarding scheduling. The purpose of the proposed mechanism is to give all provinces in Canada, all potential participants in and beneficiaries from major projects, and other interested parties a means to share in the knowledge of opportunities from major projects. Neither does the Task Force view the Assessment Agency as a duplicative, bureaucratic apparatus but as a complementing and supporting vehicle to existing government and private mechanisms.

To assist in achieving the recommendations of the Major Projects Task Force endorsed by both business and labour, the more specific objectives of the Agency will be:

- (a) to create and maintain an official source of major project demand and supply information to ensure the public dissemination of the data;
- (b) to improve the data base, analysis and flow of information about major Canadian projects in terms of needed statistics for demand and supply forecasts;
- (c) to recommend changes in programs and policies to maximize the industrial and regional benefits resulting from the planning and execution of major Canadian projects;
- (d) to recommend methods for improving communications to and between those organizations and governments involved in planning and constructing major Canadian projects or in a position to receive benefits from such projects;
- (e) to recommend methods to improve labour training and management development programs required to support the planning and construction of major Canadian projects;
- (f) by means of information, to facilitate and encourage research, development and innovation in areas of need arising from the planning and construction of major Canadian projects, with such areas of need to include but not be limited to manpower programs, import replacement, business/labour relations and bid packaging;

(g) to recommend means by which communications between major Canadian project owner/sponsors and suppliers can be improved.

To meet the above objectives of the Agency, there are a number of specific areas related to information gathering and dissemination which will be the responsibility of the Agency, including but not limited to the following:

(a) compiling and maintaining an extensive inventory of anticipated major projects by sector, time and location;

(b) identifying requirements for various classifications of manpower, materials, equipment, services and financing and an approximate schedule of such requirements for each major project in the inventory;

(c) aggregating and publicizing demands for manpower, materials, equipment, services and financing for major projects included in the inventory;

(d) developing and maintaining a data base which identifies Canadian supply capability for manpower, goods, services and financing within the areas of demand;

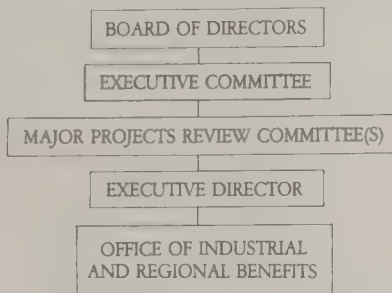
(e) identifying broadly-based opportunities for the development of Canadian manpower, technological, manufacturing and service capabilities;

(f) monitoring project-specific impacts and widely publicizing:

- supplier opportunities to develop or expand capabilities in the areas of materials, equipment and services;
- potential problem areas;
- policy alternatives to deal with opportunities and constraints;
- performance of key project participants.

## Structure

The Major Projects Assessment Agency will have the following general organizational structure:



The offices of the Agency will be located in a city to be determined by the Agency in either of the provinces of Manitoba or Saskatchewan.

### *Board of Directors*

The Board of Directors of the Agency will consist of a minimum of 30 members and a maximum of 44, equally composed of business representatives at the chief executive officer level and labour representatives at the ranking officer level.

The federal and provincial governments will participate as Associate Board Members, i.e. having non-voting status, and be represented by the minister of the appropriate department. (In the event a minister cannot attend, the deputy minister may be the representative.)

The Board Members will be chosen by the labour and business communities to ensure a regional and sectoral representation is present.

The Board of Directors will be co-chaired by a labour member of the Board and a business member of the Board.

### *Executive Committee*

An Executive Committee will be chosen from and by the Board of Directors and will consist of six labour and six business members plus the co-chairpersons.

### *Major Projects Review Committees*

Committees will be appointed by the Agency to review each specific major project from that point in time that a project starts the regulatory review procedure to its conclusion. The membership of each Review Committee will be appointed by the Board of Directors bearing in mind the nature of the project. The Executive Director will be a member of all Review Committees. The appropriate governments(s) will be represented by their Associate Board Member.

The Review Committee will submit their assessment of the project to the full Board of Directors.

### *Executive Director*

The Agency will have a full-time Executive Director to manage the affairs of the Agency under the direction of the Executive Committee.

### *Office of Industrial and Regional Benefits*

Appropriate full-time staff as approved by the Executive Committee, with Board of Directors approval as to numbers and expertise, will be hired. The staff will be known as the Office of Industrial and Regional Benefits. As approved by the Executive Committee, additional staff may be seconded from agreed upon sources (i.e. business, labour, government).

## Funding

The Task Force believes that Agency autonomy is highly important and has therefore given careful consideration to the funding mechanism. Equity and responsibility lead to the recommendation for public funding by federal and provincial governments.

The total need for funds will be small when compared to the size of major projects themselves and to their benefits. In the short term, the most

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expeditious method to obtain seed funding is for the federal and provincial governments to advance it for a specified period of time. In the long term, funding mechanisms may be developed in the form of levies, assessment fees, or tax measures imposed by government upon the major projects.

The formula for provincial funding should be based on the Gross Provincial Product (GPP). The federal government's portion will be an amount equal to the combined contribution of the provinces or such lesser amount as agreed upon.

Two methods of getting funds to the Agency are as follows:

(a) Governments would guarantee funding for the group's forecasted budget which would give the Agency access to a lending institution which would then provide funds for the Agency to draw upon during its fiscal year.

(b) Governments would pay into the Agency bank account their assessed portion of the Agency's forecasted budget.

The accounts of the Agency will be audited by the Agency's accounting firm with the Auditor General of Canada and his provincial equivalents also having the right to audit.

## Authority

The Agency will require timely information from major project sponsors in order to carry out its assessment and advisory role to government and others. It is hoped that the Agency will be able to fulfill its mandate in terms of informational needs with voluntary compliance by major project sponsors. However, in order for the Agency to completely fulfill its role and meet the objectives which are established for it in this report, it is believed that legislation to provide it with legal authority will be necessary.

Because the provinces and the federal government share jurisdiction, this will require both levels of

government to enact similar legislation. Such legislation should spell out the importance of having such an Agency and then name the Agency as the entity that would discharge the responsibilities conferred on it by the legislation.

As a first step, the Task Force will initiate the incorporation of the Agency under Part II of the Canada Corporations Act. The constitution and bylaws required for incorporation will spell out the bipartite nature of the Agency at the Board of Directors level, its subcommittee structure and its membership. An objects clause will reflect the functions the Agency will perform. Such an objects clause would also have to be reflected in any legislation developed.



The following is a list of those individuals who were appointed as members to the Major Projects Task Force. It should be noted that members participated to varying degrees, ranging from active involvement to more limited participation through monitoring of Task Force progress or passive acquiescence

## Members

Mr. Syd E. Acker  
Chairman  
L.E. SHAW LIMITED

Mr. Mike Apostolidis  
Senior Vice President and General Manager  
CANOCEAN RESOURCES LTD

\*Mr. Jack Armstrong  
Chairman and CEO  
IMPERIAL OIL LIMITED

Mr. Michel Belanger  
President  
BANQUE NATIONAL DU CANADA

Mr. S. Robert Blair (Co-chairperson)  
President and CEO  
NOVA, AN ALBERTA CORPORATION

Mr. Robert A. Boyd  
President  
HYDRO-QUEBEC

Dr. Angus Bruneau  
President  
BRUNEAU RESOURCES MANAGEMENT LIMITED

Mr. John Bulloch  
President  
CANADIAN FEDERATION OF INDEPENDENT BUSINESS

Mr. Arthur A. Burke  
International Vice President  
AMALGAMATED TRANSIT UNION

Mr. Don Burshaw  
International Vice President  
UNITED CEMENT, LIME AND GYPSUM WORKERS INTERNATIONAL UNION

Mr. Warren Cardinal  
Business Representative  
INTERNATIONAL UNION OF OPERATING ENGINEERS

Mrs. Shirley G.E. Carr (Co-chairperson)  
Executive Vice President  
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\* Indicates those members which have submitted formal dissenting views (see Appendix E).

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## MAJOR PROJECTS TASK FORCE (Consultative Task Force on Industrial and Regional Benefits from Major Canadian Projects)

### Objective 1.

To catalogue and indicate the timing of all future major projects in Canada, both public and private, which are planned or in prospect between 1979 and 1999, and to enumerate the opportunities which they may present to Canadians in terms of:

- a) employment opportunities,
- b) upgrading of skills of labour and management,
- c) employment of engineering, construction and project management firms and other specialists and strengthening their international competitiveness,
- d) employment of transportation, communication and other service companies,
- e) providing markets for manufacturers and strengthening their international competitiveness,
- f) strengthening the ability of the Canadian financial community to undertake the financing of major projects,
- g) adding to the growth of technology and research and development, and
- h) contributing to an industrial strategy, the strengthening of secondary industry, the improved utilization of natural resource, the stimulation of the business environment and the improvement of trade balances.

### Objective 2.

In respect to all items in Objective #1, to assess the maximum benefits which may be made available to Canadian labour and business. Such benefits must include the socio-economic and environmental dimensions having regard to the special needs of the various Canadian regions.

### Objective 3.

To recommend new policies and practices for increasing Canadian industrial and regional benefits from major projects in Canada, which could be adopted and implemented by industry and labour and by all levels of government.

### Objective 4.

To recommend means by which the private sector can participate in the development of future legislation, regulations and guidelines emanating from the Task Force recommendations.

### Objective 5.

To examine and recommend means of encouraging and strengthening the participation in major projects of Canadian-based, owned and controlled firms and of encouraging Canadian subsidiaries of foreign firms which have established "core" operations in Canada (including the mandate to develop, produce and market key products and services on a world-wide basis).

### Definitions

Major projects in Canada comprise:

- 1) each individual new investment for future production of goods or services which either through the size of the initial capital investment or through some anticipated major effect on employment, technology, etc., will have a significant impact on the Canadian economy; and
- 2) programs of equipment procurement, installation or replacement, such as in transportation, communications, and military procurement which will require significant capital investment.

Not to be included as "major" new projects are those other projects or programs which will require only the continuation of industrial or employment patterns already established as Canadian by 1979.

Industrial or regional benefits are recognizable developments, resulting from the conduct of major

projects, which have the capacity for significant contribution to the Canadian employment, technological and industrial base.

### Dissenting Views

In the event that an individual member or group of members wishes to register disapproval with all or part of the report of the Task Force as accepted by the majority of members, the individual member or group may file a dissenting report.



Various subcommittees were formed by the Major Projects Task Force to prepare reports to assist it in its analysis of major project demands, Canadian supply capability and other issues relative to major projects in Canada. These subcommittees are listed below:

<ul style="list-style-type: none"> <li>• Chemicals, Hydrocarbons and Pipelines Subcommittee</li> <li>• Electric Power Subcommittee</li> </ul>	Sector Demand Subcommittees
<ul style="list-style-type: none"> <li>• Mining, Primary Metals and Forest Products Subcommittee</li> <li>• Transportation Subcommittee</li> </ul>	
<ul style="list-style-type: none"> <li>• Manpower Subcommittee</li> <li>• Project Management, Design and Construction Subcommittee</li> </ul>	
<ul style="list-style-type: none"> <li>• Manufacturing Capability Subcommittee</li> <li>• Implications for High Technology Subcommittee</li> <li>• Financial Capability Subcommittee</li> </ul>	
<ul style="list-style-type: none"> <li>• Role of Government Subcommittee</li> <li>• Role of Multinational Enterprises Subcommittee</li> </ul>	Supply Capability Subcommittees



## Introduction

The Major Projects Task Force has made the following recommendation with respect to procurement premiums:

"Major project participants, both in the public and private sectors, should be encouraged to\* pay premiums totalling up to a maximum of 3% of total project cost for the development of and purchases from generally competitive Canadian-based suppliers. Premiums should be allotted among Canadian-based firms in cases where it will contribute to the creation of new long-term industrial capability in Canada that can operate on a generally competitive basis."

This recommendation is not intended to encourage major Canadian projects to use goods and/or services which are not, or will not be, generally competitive over the long term. Such an approach applied to items which Canada does or should export would have the ultimate consequence of reducing the competitiveness of Canadian-based firms in international markets, thus reducing the size of the potential market to be served. Where exports from Canada are not involved, lack of competitiveness over the long term would require Canada to be increasingly protectionist in order to continue to secure domestic markets and provide related employment. In either case, these developments would reduce the net long-term benefits to Canada.

On the contrary, the recommendation is aimed at developing a broader understanding of the words "generally competitive" than has frequently been the case in the past.

## Discussion

Purchases of goods and services for major Canadian projects have traditionally been and continue to be made on the basis of bid evaluations, in which proposals are reviewed in respect to readily quantifiable commercial terms as well as technical acceptability. Commercially, such reviews take into account such factors as:

- (a) purchase price FOB supplier's plant;
- (b) transportation costs from supplier's plant to job site;
- (c) duties and taxes;
- (d) the effect of various terms of payment;
- (e) ability to meet stated delivery schedules.

Technically, the prime consideration is naturally suitability for the purpose intended.

Relatively few instances can be identified where much consideration has been given to other vital aspects of procurement such as long-term security of supply. In past Canadian major projects, it is understandable that this factor has been of limited importance in the procurement decision-making process. At this time, however, as Canada and the rest of the world embark on what appears to be a sustained period (10 to 20 years) of major project demands for goods and services, supply constraints already exist for some commodities and more are likely to develop. Long-term considerations must therefore become a much more important part of Canadian major project procurement decision making.

In formulating its recommendation regarding procurement premiums, the Task Force recognized that there are a number of factors which should be considered in any procurement evaluation which are not listed above. These factors recognize the mutual long-term advantages of business being carried out between purchasers and suppliers who are both part of the same general community. Some of these factors are:

- (a) eliminating the uncertain costs associated with non-Canadian currency fluctuation;
  - (b) working directly with the supplier to minimize reliability and maintenance costs over the life cycle of the equipment (these costs are over and above considerations related to spare parts inventories);
  - (c) minimizing general contract administration costs as a result of such considerations as common purchaser/supplier language and manufacturing and quality codes, as well as other directly related contract administration costs (in terms of both dollars and time) for such items as telephone/telex communication and travel;
  - (d) strengthening security of supply - To the extent that purchasers become actively involved with a given supply base and the supply base in turn becomes more committed to given purchasers, there is a greater tendency to work together to meet each other's challenges. Provided both purchasers and suppliers take a long-term view of this dynamic interaction, both parties benefit through stronger purchaser/supplier relationships.
- Although each purchase has to be assessed individually as to the weight the above items should be given in the decision-making process, various efforts have been made to quantify these factors in percentage terms. One example of a general guideline related to point (c) above would be a 2½ to 3% premium on medium-sized material supply contracts (\$50 000 to \$2 500 000), with this percentage being determined by accounting for the additional time and expense involved in administering contracts placed with companies who are not based in Canada. Depending on their nature, similar-sized service contracts might easily justify higher "premiums".

In any consideration of the project procurement premium being recommended, several factors must be kept in mind. First, the willingness to pay premiums under particular circumstances does not mean that any significant expenditures will indeed be made as a result. For example, one member of the

\*The business and labour recommendations differ in that the three italicized words appear in the business recommendation and not in the labour recommendation.

Task Force observed that on one of his firm's own projects (worth \$400 million in 1975 dollars), where the procurement policy allowed for the payment of premiums of up to 15% for individual local purchases, only one quarter of one percent of the final project cost was attributable to the actual payment of such premiums. Second, under the Task Force's recommendation, the owner/sponsor or his agent determines both how much of a premium should be paid on an individual purchase as well as when such premium payments are justified at all.

The Major Projects Task Force is of the opinion that companies who orientate themselves to actively working with Canadian-based suppliers to develop the required capability will ultimately pay out very little in the form of premiums. In fact, the expectation is that over the long term (five to ten years) the active development of generally competitive Canadian-based suppliers will result in significant dollar savings to the owner/sponsors and ultimately to the consumers of major projects.

This point was recently demonstrated in the award of purchase contracts, valued at approximately \$2 billion, to Canadian suppliers for the supply of line pipe for the Canadian portion of the Alaska Highway Gas Pipeline Project. The competitiveness of the successful Canadian-based manufacturers was largely a consequence of their long-standing relationship with, and purchase support from, the Canadian pipelining industry - a relationship which is over 20 years old. Throughout this period, Canadian-based manufacturers of line pipe have consistently priced their products in relation to their costs, while the prices of line pipe-manufactured outside of Canada (often in government-supported industrial complexes) have more frequently been reflective of worldwide supply/demand. As a result of these different pricing philosophies, prices for line pipe manufactured in Canada over the 20-year period have varied from 50% to 105% of the prices associated with the same product supplied by international manufacturers. The net effect of consistently purchasing from Canadian-based manufacturers, despite international prices

which have occasionally been lower, has been the sustaining of Canadian-based supply sources while at the same time, in the aggregate, saving money for Canadian and U.S. gas consumers.

## Conclusion

Using Canadian-based suppliers, who are or have the potential of being generally competitive, in the planning and construction of Canadian major projects makes good economic sense. On this basis, and using the rationale outlined above, procurement premiums totalling up to a maximum of 3% of total project cost have been recommended. In any discussion of premium payments, however, it must always be recognized that the associated objective is the creation of new long-term Canadian technological and industrial capacity which, in themselves, will contribute to long-term employment opportunities and Canada's domestic security of supply.

Printed below, in full, are comments received in writing from various members of the Task Force wishing to express dissenting views.

**TEXT OF A LETTER RECEIVED FROM  
MR. J.A. ARMSTRONG,  
CHAIRMAN AND CEO, IMPERIAL OIL LIMITED:**

*The consultations of Task Force members over the past several years have resulted in a series of recommendations that will, in my view, help achieve the objective of maximization of Canadian industrial and regional benefits from major projects.*

*There will continue to be differences in views between labour and business on many matters affecting the economy. However, the major areas of consensus reached by Task Force members are an indication of the shared objective of both groups to an improved quality of life for Canadians.*

*As you know, Imperial Oil has been a major participant in Canada's economic life for over a century and has tried its best to reflect the concerns of the community at large in its operations and investments. For the record, I would like to reiterate several comments that have been previously conveyed by us in Task Force, subcommittee or steering committee meetings.*

*The most powerful way to maximize industrial benefits to Canada is to have the major project investments take place in the first place. This requires a stable investment climate, great tenacity and goodwill to resolve intergovernmental conflicts and a perception that major investments once made will not be subjected to unfair or unreasonable rule changes. Private business will take risks more readily if investors feel that upside rewards can accrue to the investment winners and not be shaved away.*

*There is a need to ensure that readers of the Task Force report understand the intent of the references to Canadian-owned and Canadian-based firms. There is a widely held feeling in Canada that Canadians should have every opportunity to participate in*

*Canada's growth potential. We all agree with that desire. The question of fairness and corporate performance, however, must be given due consideration. It would be a mistake to assume that Canadian-owned firms will by definition, as it were, produce industrial and regional benefits in excess of those provided by Canadian-based firms. The Western industrialized world is moving toward equal treatment of nationally-owned and established non-nationally owned firms. Any perception by our trading partners upon whom we are highly dependent that we are out of step with the international consensus can only result, perhaps imperceptibly at first, in retaliatory action not in Canada's long-term interests. Within this context, corporate performance, including cash flow reinvestment records, are much more pertinent than ownership as criteria for measuring contributions to Canadian industrial benefits.*

*I am strongly in favour of a mechanism that gathers and analyzes information related to major project investments and helps to determine and widely publicize materials and services demand and supply opportunities. I am doubtful, however, about the ability of the proposed agency to outguess the competitive market to the extent required to reach conclusions that could affect project scheduling. Severe potential project bunching problems would be an important determinant of construction timing by project sponsors themselves and provincial governments and are problems that would be resolved at that level. In the absence of this kind of severity, the market will sort things out most efficiently. This does not mean, however, that concerns of labour members such as training, manpower mobility, etc., should not be addressed by necessary changes in government policy, perhaps as a result of Agency recommendations.*

*My last point deals with the proposed procurement premium. The spirit of the recommendation is important and I believe that inclusion closer to the recommendation of key points in the material included in Appendix D would have insured that*

*readers understand that the program, as proposed by business, is voluntary and one that I suspect most enlightened companies in Canada have been following in one form or another. Project economics are highly sensitive to cost variations and it would be important that procurement policies recognize that one set of investors (project sponsors) should not be expected to subsidize another set of investors (suppliers) unless long term benefits to both parties are perceived. I believe this is the intent of the recommendation but I think it is important that it be explicitly stated.*

**TEXT OF A LETTER RECEIVED FROM  
MR. H.T. FARGEY,  
EXECUTIVE VICE-PRESIDENT, COMINCO LTD.:**

*About two years ago Cominco Ltd. accepted an invitation from the then Minister of Industry, Trade and Commerce, The Honourable Jack Horner, to join with representatives of labour and industry in a Task Force study to consider the social and economic impacts on Canada of major capital projects which may develop over the next 20 years. Representing Cominco Ltd. on the Task Force were Mr. Gerald Hobbs and myself.*

*Recently the report of the Task Force was circulated in draft form to all participants for their approval. I regret to advise that Cominco disagrees with a number of the report's recommendations and cannot support or approve the report.*

*One of its key recommendations is for the creation of a Major Projects Assessment Agency. We do not find persuasive the arguments presented in support of this idea. We believe such an agency, given the complex nature of its structure and mandate and its clearly interventionist character, would be counter-productive. In our opinion it would hinder rather than help industrial progress in Canada.*

*The report of the Task Force repeatedly draws attention to the anticipated reduction in Canadian imports of goods and services deemed attainable by implementing its recommendations and equates this*

to a benefit for Canada. Conspicuous by its absence, however, is any consideration of potential negative effects from such a course of action.

Canada is one of the world's great trading nations. Its success in supplying goods and services to foreign markets has greatly benefited its economy and the welfare of Canadians. Continuation of this success depends on maintaining good relationships with our trading partners, and this is a matter of particular sensitivity in times of worldwide economic difficulty such as now prevail. Canada needs continuing unfettered access to world markets for its goods and services.

International trade is a two-way street. In order to sell, one must be prepared to buy. In our view implementation of the recommendations of the Task Force could not be done with impunity. It would be considered by Canadian trading partners as a concerted effort on the part of Canadian industry, labour and governments, both provincial and federal, to restrict their access to the Canadian market. In this event the benefits for Canada anticipated in the report of the Task Force could prove illusory.

I am writing this letter to inform you of Cominco's position and to ask that it be incorporated in the report of the Major Projects Task Force in its final published form.

**TEXT OF A LETTER RECEIVED FROM  
MR. R.C. FRAZEE, CHAIRMAN AND CEO,  
ROYAL BANK OF CANADA:**

The purpose of this letter is to express my dissenting view with respect to the proposed treatment of Canadian-based foreign-owned firms in the Task Force report. Specifically, I do not agree with the recommendations in the report which relegate these Canadian firms to a secondary position with respect to their participation in the major Canadian investment projects over the next two decades.

Before expressing my concerns in more detail, however, I do wish to emphasize my strong support

for the bipartite process underlying this substantial effort at analysis and compromise.

The stated objective of the Task Force report is the maximization of employment opportunities, the upgrading of labour and management skills and, in general, the optimization of Canadian economic growth.

It is my view that these goals can best be realized in an environment characterized by open competition and the free flow of financial capital and economic resources. Long-run benefits to Canada will depend, in the end, on economic efficiency achieved by a market-based allocation of resources. This principle is valid both for the economic activity within the geographic boundaries of Canada and for our economic relations with other nations.

Indeed, this is the spirit and the letter of Canada's international agreements with its trading partners. The signatories to the GATT and OECD commitments would not be so numerous if it were not clear to them that the economic welfare of their nations, especially those that are industrialized, is enhanced by the principles of open competition. For Canada to seek special status in this regard can prove to be detrimental to its future economic growth.

Examples of successful Canadian entrepreneurship abound, as do examples of the development of indigenous technical expertise and managerial know-how that have led to Canadian ownership and control of certain sectors of the economy. Moreover, in some sectors where foreign ownership has predominated, the shift to increased Canadian ownership and control has been significant and persistent in recent years.

More importantly, there can be no doubt that the ultimate control of the natural resources of Canada and of its economy does already rest with Canadians and their freely elected governments. Energy resources are a case in point. Virtually all energy sources in Canada are owned by government and either developed and produced by them or leased to others to be developed and produced according to terms set

out by governments. These leases, as well as numerous rules and regulations, set out all the relevant details of ownership, the amount and pace of development, the time and volume of production, the price to be received, the royalties and taxes to be paid, and the permission required to transport the product within the provinces, between provinces, or for export. This, I suggest, is absolute control.

There is no doubt in my mind that the operations of foreign-owned but Canadian-based firms with a record of good corporate citizenship are of substantial benefit to Canada, and will unquestionably help Canada achieve the objectives mentioned in the third paragraph above. Such firms have a permanent Canadian presence; a Canadian Head Office; employ Canadians in the majority, including management personnel; and have a majority of Canadians on their Board of Directors.

To relegate such firms to a secondary position in terms of their opportunities to contribute to the major projects under review would, in my view, be both discriminatory and counterproductive to the above-mentioned objectives.

Thus, I believe that the proposed recommendations of the Task Force report listed in the Appendix to this statement are detrimental to the future economic well-being of Canadians, uncalled for given the terms of reference of the Task Force and based on totally unproven postulates.

The main thrust of the report would not be affected by the elimination of these three objectionable recommendations or the related passages in the earlier chapters. There are more than forty (40) other recommendations to guide the proposed monitoring agency.

It is indeed ironic that these recommendations of discrimination should be directed against the very firms that all three levels of government in Canada have consistently and unabashedly attempted to attract to their respective jurisdictions, with the use of the Canadian taxpayers' dollars.

*To the best of my knowledge, no other industrialized country in the Free World discriminates in these proposed ways against foreign-owned firms which have already located within their jurisdictions. Indeed, such discrimination directly contravenes both the letter and spirit of the "national treatment" provisions of OECD agreements to which Canada is a signatory, albeit with some reservations.*

*It is not the Canadian control of this country's resources and economy that are being questioned here; but rather, the methods whereby this is achieved. Given our sovereign authority to decide these methods, I believe we should be both wise and fair in our application of such authority. I do not believe the recommendations from which I am dissenting meet these tests.*

*In closing, I wish to stress once again my continued overall support of the process embodied in the Task Force exercise.*

#### APPENDIX TO LETTER FROM R.C. FRAZEE OBJECTIONABLE RECOMMENDATIONS

**Recommendation:** *Recognizing that potential participants in major projects have to be assessed on a firm by firm basis in order to determine the contribution they will make to the maximization of Canadian industrial and regional benefits, Canadian-owned firms or, as a second priority, other Canadian-based firms, should be selected to play key actor roles (including owner/sponsors, MEPC firms, and suppliers sub-suppliers of goods and services) in future major Canadian projects.*

**Recommendation:** *Recognizing that potential suppliers to major projects have to be assessed on a firm by firm basis in order to determine the contribution they will make to the maximization of Canadian industrial and regional benefits, major project participants, both in the public and private sectors, should give preference in their procurement policies to suppliers of goods and services (including project management, engineering, procurement and construction services) in the following order of*

*priority: 1) Canadian-owned firms; 2) Canadian-based firms; 3) others.*

**Recommendation:** *Major project participants, both in the public and private sectors, should make every effort to facilitate the participation of Canadian-owned suppliers of goods and services (including project management, engineering, procurement and construction services) in major projects. Where no Canadian-owned firm is capable of undertaking all of the work associated with a particular aspect of a major project, work should be packaged in terms of size, scope and timing in a way that allows the maximum participation by Canadian-owned firms and, as a second priority, by other Canadian-based firms. Major project participants should encourage the participation of these firms in a manner that provides them with the experience base necessary to meet more extensive portions of major project demands in the future.*

#### TEXT OF A LETTER FROM MR. J.M. HAY, PRESIDENT AND CEO, DOW CHEMICAL OF CANADA, LIMITED:

*This letter is written to inform you of my view of the final report of the Major Projects Task Force. Before I do so I would like to express my appreciation for the opportunity to serve on the Task Force. Although I disagree with a number of the conclusions and recommendations of the report, I support the general thrust of the effort to carry out major projects in a manner most beneficial to Canada. I acknowledge also the considerable effort expended by the members of the Task Force in attempting to reconcile all of the conflicting views and objectives.*

*Like, I suppose, all members of the Task Force involved in seeking a consensus I have reservations about a number of recommendations and conclusions. Among these are the definition of three per cent as the number for the premium, legislation permitting establishment of project agreements and a concern as to whether the Assessment Agency will*

*develop as a constructive agency or become a further government intervention in Canada's economy.*

*While these are areas for concern, the issue of foreign equity in Canada is much more fundamental. It is a major position of the Task Force that foreign-controlled Canadian-based companies do not contribute to maximizing the benefits to Canada from major projects to the same degree that Canadian-controlled companies contribute.*

*In previous correspondence and discussion I have outlined my position on this issue, but I would like to summarize again. The data in the report show that Canadian ownership has been increasing and I am sure it will continue to increase because of the actual performance of Canadian-owned companies.*

*However, I do not think that the distinction between foreign and domestic equity companies, as an overall general position, and the establishment of a priority for domestic equity companies, contributes to the goal of maximizing the benefits to Canada of major projects.*

*In fact, I think, in the area of high technology manufacturing such as the chemical industry, this distinction will be counterproductive. To encourage this type of industry I believe we need to encourage foreign equity. It brings with it access to world markets and competitive technology not otherwise obtainable. Further, we have already existing in Canada many Canadian-based firms with foreign ownership. If we inhibit their opportunity to grow in Canada, we cannot expect to maximize benefits to Canadians.*

*In addition to its direct impact on such industries, the position taken in the report is at this time further demonstration of the risks undertaken by foreign investors in Canada. As a result, it will have a negative impact on the availability of foreign investment funds.*

*Finally, as a Canadian who has personally spent more than twenty years working for a foreign-owned and controlled Canadian-based company, I cannot agree*

with the major policy thrust of the report. I have observed first hand on innumerable occasions the desire of this company to be responsive to Canada's objectives. More importantly, I believe Dow Canada has made a major contribution to Canadian economic growth.

I believe that making an equity ownership distinction between Canadian-based companies is a major policy in this final report. I don't believe that such a distinction will materially change the benefits to Canadians from major projects. It will inhibit the development of high technology industry. Further, I believe it will reduce foreign financing flexibility available to all Canadian-based companies. Finally, my own experience suggests that the premise on which this distinction is made is false.

For these reasons, I submit this dissenting view and request that it be published as part of the Task Force report.

**TEXT OF A LETTER RECEIVED FROM  
DR. J. MACNAMARA, CHAIRMAN AND CEO,  
ALGOMA STEEL CORPORATION, LIMITED:**

*The purpose of this letter is to identify the fundamental points contained in the final Major Projects Task Force report with which I am unable to associate the positions of either myself or The Algoma Steel Corporation, Limited. While these issues are few in number I believe they are sufficiently important to justify this dissenting view.*

*There were only minor points of contention among the business and labour members on the two subcommittees I worked with, but very contentious issues emerged at the Steering Committee and Task Force level which, in my opinion, were not resolved in a satisfactory manner. I believe that the positions set out herein are consistent with comments and opinions I expressed at various Steering Committee and Task Force meetings.*

*There are our main points with which I must take issue. These are best enunciated as follows:*

1. I cannot accept the potentially interventionist nature of the proposed implementation mechanism. While there is unquestionably a need for a more effective information gathering and dissemination mechanism as it relates to major projects supply, demand and opportunity spectrums, I cannot support any organization or body which could recommend or ultimately take regulatory, quasi-regulatory or possible scheduling action. Beyond the interventionist overtones, such a body could only serve to heighten the areas of conflict and concern associated with federal/provincial jurisdictions.

2. Any identified premium (such as the 3 percent premium based on total project cost), whether it is regulated or set out as a guideline, is an unacceptable and unnecessary variable to impose on Canadian major project sponsors.

*I recognize the desirability and value of establishing Canadian sources of supply for secondary manufactured goods and as a matter of policy, The Algoma Steel Corporation, Limited follows a practice which ensures that Canadian content is maximized. Wherever possible, Canadian secondary manufacturers are encouraged to obtain technology if it is not available in Canada or to establish facilities which will allow these manufacturers to participate as a competitive supplier of the major and minor components required by Algoma in its operations and capital expenditure programs. While this has often led to premiums in excess of 3 percent, there are logical and valid arguments to support this course of action. However, these decisions are not the result of the imposition of any non-free market criteria in Algoma's decision making process.*

3. The question of Canadian-owned, Canadian-based and non-Canadian companies is one which received a great deal of discussion both in the report and during the deliberations of the Task Force. I am firmly of the opinion that major Canadian projects will require the capital, the expertise and the technology of firms in all three of these categories if we are to engineer, design and construct major projects which will afford

*the most efficient production facilities in the world. Canadian ownership should be our long term objective but neither Canadian-based or non-Canadian companies should be excluded or sacrificed in the short term, when in many cases, they are the only viable agency for development.*

4. There are also a number of references and inferences throughout the report to philosophies, guidelines and an implementation mechanism which would indicate support for the concept of a "planned economy." I find that such are inappropriate and believe it is essential that free market forces continue to prevail.

*Also, I believe that major projects have to be viewed as business ventures first and job creating mechanisms second. While employment opportunities will be a primary benefit, these projects must continue to be justified on the basis of their economic viability.*

*The first step towards maximizing Canadian benefits will be to get the major projects underway. Canada is on the threshold of an unprecedented period of investment and economic activity and the potential for prosperity is there for all Canadians to realize.*

It should be noted that each of the points raised by these members had been carefully considered in the proceedings of the Task Force, however the opinions expressed remain at variance with the consensus findings expressed in this report.

This inventory of major Canadian projects to the year 2000 is based on information concerning investment intentions within various sectors obtained during the course of Task Force subcommittee work and through a canvas of Task Force members. It includes only those projects with a cost of \$100 million or more and specifically excludes real estate and property development projects. Because of the wide variation of information sources, the project cost estimates included in the inventory are not stated on a completely consistent basis throughout. It is understood that most of the estimates are escalated to the year of expenditure by taking expected inflation rates into account. In some cases, however, constant 1980 dollars are used. In a few other cases, where projects have been delayed, cost estimates are stated as if the project had commenced as planned at the time the cost estimate was prepared and have not been adjusted to reflect recent schedule changes. Finally, a number of projects were identified without cost estimates, and in those cases order-of-magnitude capital costs have been estimated by the Task Force as indicated by the notation "(e)" following the cost figure.

\*Based on information gathered up to February 28, 1981.

**Table F-1** Province **MULTI-PROV./UNDETERMINED**  
Sector Exploration & Development

OWNER/SPONSOR	PROJECT	LOCATION	ESTIMATED CAPITAL COST (\$ MILLIONS)	CONST. MANPOWER		OPERATING MANPOWER	CONST. PERIOD FROM TO	COMMENTS
				PEAK FORCE	MAN YEARS			
Arctic Pilot Project	LNG	Melville Island to Eastern Canada	2 500				1981 - 86	6.3 x 10 <sup>6</sup> m <sup>3</sup> /d; includes necessary pipeline, plants, terminals & tankers (assumes Gros Cacouna regasification plant)

**Table F-2** Province **Multi Prov./Undetermined**  
Sector Pipelines

OWNER/SPONSOR	PROJECT	LOCATION	ESTIMATED CAPITAL COST (\$ MILLIONS)	CONST. MANPOWER		OPERATING MANPOWER	CONST. PERIOD FROM TO	COMMENTS
				PEAK FORCE	MAN YEARS			
AMOCO	Products Pipeline	Nova Scotia/Quebec	140				1982 - 83	
Dome Petroleum	Cochin Pipeline Looping	Alberta and Saskatchewan	125				1982	
Foothills Pipe Lines	Alaska Gas Pipeline	Alaska/Yukon Border to Southern Canada/US Border	8 365	4 535	11 875	400	1980 - 85	2035 km; 56 x 10 <sup>6</sup> m <sup>3</sup> /d
Interprovincial Pipe Line	Norman Wells Oil Pipeline	Norman Wells, NWT to Zama Lake, Alta	365	400-600			1981 - 83	870 km; 324-mm O.D. pipe
Polar Gas	Gas Pipeline	Melville Island to Longlac, Ont.	12 300		36 950	725	1989 - 94	4800+ km; 38 x 10 <sup>6</sup> m <sup>3</sup> /d
TQ & M Pipeline	Gas Pipeline and Gas Dist.	Montreal to Quebec and Maritimes	2 285				1981 - 84	Includes Maritime sections and major distribution laterals
TransCanada Pipelines	Bypass Gas Line Looping & Compression	North Bay to Montreal Saskatchewan, Manitoba and Ontario	200 360				1982/83 - 84 1980 - 81	460 km; boucles de 1067 mm d.e 11 stations de compression
Transmountain Pipe Line	New Oil Pipeline	Port Angeles to Edmonton	750				1981 - 83	1125 km; 762-mm O.D. pipe
Unknown	Municipal Gas Dist. Systems	Quebec and Maritimes	1 200 +				1981 - 2000	Associated with TQ & M gas pipeline
Unknown	Coal Slurry Pipeline	Hinton Region of Alberta to Pacific Coast	1 000				1983 - 85	Thermal coal

**Table F-3** Province **Multi-Prov./Undetermined**  
Sector Electric Generation & Transmission

OWNER/SPONSOR	PROJECT	LOCATION	ESTIMATED CAPITAL COST (\$ MILLIONS)	CONST. MANPOWER		OPERATING MANPOWER	CONST. PERIOD FROM TO	COMMENTS
				PEAK FORCE	MAN YEARS			
Unknown	Western Power Grid	Alberta, Saskatchewan and Manitoba	620				- 87	

**Table F-4** Province Multi-Prov./Undetermined  
Sector Manufacturing

OWNER/SPONSOR	PROJECT	LOCATION	ESTIMATED CAPITAL COST (\$ MILLIONS)	CONST. MANPOWER		OPERATING MANPOWER	CONST. PERIOD FROM TO	COMMENTS
				PEAK FORCE	MAN YEARS			
Dome Petroleum	4 LNG Tankers (125 000 m <sup>3</sup> capacity)		1 400				- 85	To transport output from B.C. LNG Plant
Petro-Canada	Semi-sub. Drilling Rig		100					
Unknown	Class 10 Tankers and Barges		4 320 2 255					To transport oil from Beaufort Sea  Fleet upgrading
Various	Trawler Replacement Program Program - East Coast Fishing Industry		500				1981 - 86 +	

**Table F-5** Province Multi-Prov./Undetermined  
Sector Defence

OWNER/SPONSOR	PROJECT	LOCATION	ESTIMATED CAPITAL COST (\$ MILLIONS)	CONST. MANPOWER		OPERATING MANPOWER	CONST. PERIOD FROM TO	COMMENTS
				PEAK FORCE	MAN YEARS			
Department of National Defence	Fighter Aircraft Patrol Frigates		2 860				1979 - 87	
			1 965				1979 - 89	

**Table F-6** Province ATLANTIC (ATLANTIC CANADA — NEW BRUNSWICK NEWFOUNDLAND NOVA SCOTIA PRINCE EDWARD ISLAND)  
Sector Exploration & Development

OWNER/SPONSOR	PROJECT	LOCATION	ESTIMATED CAPITAL COST (\$ MILLIONS)	CONST. MANPOWER		OPERATING MANPOWER	CONST. PERIOD FROM TO	COMMENTS
				PEAK FORCE	MAN YEARS			
Esso Resources	Offshore Exploration	Offshore Nfld.	250				1980 - 85	Includes processing and gathering facilities
Mobil et al	Hibernia Development	Grand Banks, Nfld.	8 000				1983 - 92	
	Sable Island Development	Sable Island, N.S.	1 000				1980 - 85	
Labrador Group (Petro-Canada)	Exploration Program	Offshore Labrador	500-1000				1980 - 90	
Shell/Texaco	Gander Block Exploration	400 km N.E. of St. Johns, Nfld.	1 500				1981 - 85	

**Table F-7** Province Atlantic  
Sector Pipelines

OWNER/SPONSOR	PROJECT	LOCATION	ESTIMATED CAPITAL COST (\$ MILLIONS)	CONST. MANPOWER		OPERATING MANPOWER	CONST. PERIOD FROM TO	COMMENTS
				PEAK FORCE	MAN YEARS			
Mobil et al	Atlantic Gas Pipeline	Sable Island to Mainland N.S.	935				1983 - 84	
Unknown	Oil Pipeline	From Grand Banks Region to Nfld.	250(e)					

**Table F-8** Province Atlantic  
Sector Processing & Petrochemicals

OWNER SPONSOR	PROJECT	LOCATION	ESTIMATED CAPITAL COST (\$ MILLIONS)	CONST. MANPOWER		OPERATING MANPOWER	CONST. PERIOD FROM TO	COMMENTS
				PEAK FORCE	MAN YEARS			
Petro-Canada	Refinery Reactivation	Come By Chance, Nfld.	200				1980 - 81	
Unknown	Ammonia Plant	Nfld.	200				1981 - 82	
Unknown	Methanol Plant	Nfld.	100				1981 - 82	

**Table F-9** Province Atlantic  
Sector Electric Generation & Transmission

OWNER SPONSOR	PROJECT	LOCATION	ESTIMATED CAPITAL COST (\$ MILLIONS)	CONST. MANPOWER		OPERATING MANPOWER	CONST. PERIOD FROM TO	COMMENTS
				PEAK FORCE	MAN YEARS			
Nfld. & Labrador Hydro	Gull Island-Hydro	Labrador	1 500		11 000	80	1979 - 95	Churchill River; 1700 MW
	Lower Churchill Phase I						1979 - 86	\$1600 million; 600 MW
	Lower Churchill Phase II						1990 - 95	\$2000 million; 1100 MW
	Submarine Power & Cable	Labrador-Nfld.	Incl. in Gull Island/ Muskrat Falls					2000 amp; 400 kV DC
	Muskrat Falls-Hydro	Labrador	3 200				1981 - 86	600 MW
	Upper Salmon-Hydro		155				1979 - 82	84 MW
	Holyrood-Thermal		100				1981 - 84	
	Transmission/Switching		295				1980 - 99	
N.S. Power	Tidal Power Pilot*	Annapolis Basin, N.S.	45				1980 - 83	
	Tidal Power Full Scale	Bay of Fundy, N.S.	10 000		8 400	50	1983 - 95	1100 MW Cumberland Basin
	Conversions Oil to Coal	Various locations in N.S.	2 000				1986 - 91	660 MW
	Nuclear 1		1 020				1990 - 95	660 MW
	Nuclear 2		805				1982 - 86	2 @ 150 MW
New Brunswick Power	Lingan 3 & 4-Thermal		600					
	Unit 2 - Candu	Point Lepreau, N.B.	1 790				1988 - 92	600 MW
	Unit 1	Point Lepreau, N.B.	1 160		4 500	227	- 81	600 MW
	Grand Lake 9 - Thermal	Newcastle Creek, N.B.	340				1989 - 93	
	Grand Falls Redevelop -Hydro		300				1983 - 85	60 MW to 320 MW facility
Unknown	Nuclear Station		1 310				1992 - 98	630 MW
	Cataract	Unknown	250				1981 - 84	150 MW

\*Included on the basis of new technology

**Table F-10 Province** Atlantic  
**Sector** Forest Products

OWNER/SPONSOR	PROJECT	LOCATION	ESTIMATED CAPITAL COST (\$ MILLIONS)	CONST. PEAK FORCE	MANPOWER MAN YEARS	OPERATING MANPOWER	CONST. PERIOD FROM TO	COMMENTS
Canada Int'l Paper	Expansion	Dalhousie, N.B.	160					
N.S. Forest Ind.	Sulphate & Kraft Paper Conversion	Point Tupper, N.S.	150					

**Table F-11 Province** Atlantic  
**Sector** Mining

OWNER/SPONSOR	PROJECT	LOCATION	ESTIMATED CAPITAL COST (\$ MILLIONS)	CONST. PEAK FORCE	MANPOWER MAN YEARS	OPERATING MANPOWER	CONST. PERIOD FROM TO	COMMENTS
Kitts Michelin	Uranium Mine & Mill	Labrador (Makkovik area)	160					
Devco	Coal Mine (Donkin) Rehabilitation #26 Colliery	Cape Breton, N.S. Sydney, N.S.	400 165		1 500	1 000	1979 - 86 1979 - 84	
Potash Corp. of America	Potash Mine & Refinery	Sussex, N.B.	135				- 1982	635 kt/yr
Denison Mines	Potash Mine & Refinery	Salt Springs, N.B.	150				- 1983	1.2 - 1.4 Mt/yr

**Table F-12 Province** Atlantic  
**Sector** Primary Metals Production

OWNER/SPONSOR	PROJECT	LOCATION	ESTIMATED CAPITAL COST (\$ MILLIONS)	CONST. PEAK FORCE	MANPOWER MAN YEARS	OPERATING MANPOWER	CONST. PERIOD FROM TO	COMMENTS
Sydney Steel	Modernization Phase I Phase II	Sydney, N.S. Sydney, N.S.	550 175					
Unknown	Aluminum Smelter	Corner Brook or Goose Bay, Nfld.	500				1982 - 84	180 kt/yr ingot

**Table F-13 Province** Atlantic  
**Sector** Transportation

OWNER/SPONSOR	PROJECT	LOCATION	ESTIMATED CAPITAL COST (\$ MILLIONS)	CONST. PEAK FORCE	MANPOWER MAN YEARS	OPERATING MANPOWER	CONST. PERIOD FROM TO	COMMENTS
National Harbours Board	Container Port Expansion Port Expansion	Halifax, N.S. St. John, N.B.	155 155				1979 - 97 1981 - 91	
Unknown	Rail Terminal/ Industrial Park	Halifax, N.S.	120				1983 - 90	

**Table F-14 Province Atlantic**  
**Sector Manufacturing**

OWNER/SPONSOR	PROJECT	LOCATION	ESTIMATED CAPITAL COST (\$ MILLIONS)	CONST. MANPOWER		OPERATING MANPOWER	CONST. PERIOD FROM TO	COMMENTS
				PEAK FORCE	MAN YEARS			
Minebea	Tire Plant	Waterside, N.S.	400				1980 - 82	

**Table F-15 Province Atlantic**  
**Sector Defence**

OWNER/SPONSOR	PROJECT	LOCATION	ESTIMATED CAPITAL COST (\$ MILLIONS)	CONST. MANPOWER		OPERATING MANPOWER	CONST. PERIOD FROM TO	COMMENTS
				PEAK FORCE	MAN YEARS			
Department of National Defence	Halifax Base	Halifax, N.S.	280				1979 - 89	

**Table F-16 Province QUEBEC**  
**Sector Processing & Petrochemicals**

OWNER/SPONSOR	PROJECT	LOCATION	ESTIMATED CAPITAL COST (\$ MILLIONS)	CONST. MANPOWER		OPERATING MANPOWER	CONST. PERIOD FROM TO	COMMENTS
				PEAK FORCE	MAN YEARS			
CIL	Chloralkali Plant		100				1979 - 82	
Gulf Canada	Refinery - Modernization and Upgrading	Montreal	100				1981 - 83	
Gulf Canada et al	Heavy Fuel Oil Upgrader	Montreal	1 500				1982 - 85	7.9 - 9.5 x 10 <sup>6</sup> m <sup>3</sup> /d
Petromont Inc. (Gulf/Union Carbide/Gov't of Quebec)	Olefins Plant - Expansion	Varenes	500			350	1981 - 85	Approx. 180 kt/yr. ethylene
Ultramar - Golden Eagle Refinery	Cat. Cracker for Resid. Oil	Quebec City	150				1980 - 82	Fluor - general contractor
Unknown	Vinyl Chloride Monomer		100				1988 - 90	
Unknown	Titanium Oxide		150				1985 - 86	
Various	Downstream Derivatives, Varenes Expansion		500				1983 - 87	

**Table F-17 Province Quebec**  
**Sector Electric Generation & Transmission**

OWNER SPONSOR	PROJECT	LOCATION	ESTIMATED CAPITAL COST (\$ MILLIONS)	CONST. MANPOWER		OPERATING MANPOWER	CONST. PERIOD FROM TO	COMMENTS
				PEAK FORCE	MAN YEARS			
Hydro Quebec	La Grande River Phase I	James Bay	3 565				1980 - 86	
	La Grande River Phase II	James Bay	7 290				1985 - 92	3000 MW
	Nottaway Broadback Rupert- Hydro - Phase I	James Bay	10 240				1981 - 90	
	- Phase II		20 000				1990 - 2000	8500 MW
	Grande Baleine	James Bay	7 680				1981 - 90	
	Delaney-Pump Storage		1 000				1983 - 87	1500 MW
	Aschumachuan Substation	Saguenay/Lac St. Jean Area	1 000				1989 - 95	
	Laprade Heavy Water Plant							
	MANIC 5 Manicougan Project		900				1980 - 83	Capacity expansion
	Gentilly No. 2 - Nuclear	Gentilly	490				- 83	685 MW
	Gentilly No. 3 - Nuclear	Gentilly	2 895				1985 - 95	850 MW
	Gas Turbines	Various	1 705					Peaking units
	Hydro - others	Various	1 365					
	Nuclear - others	Various	1 125				1986 - 90 +	
	High Voltage Transmission	James Bay	1 750				1985 - 90 +	
	High Voltage Transmission	Various	3 470				1981 - 83	
	High Voltage Transmission	Various	1 860				1981 - 90	735 kV Up to 315 kV

**Table F-18 Province Quebec**  
**Sector Forest Products**

OWNER/SPONSOR	PROJECT	LOCATION	ESTIMATED CAPITAL COST (\$ MILLIONS)	CONST. MANPOWER		OPERATING MANPOWER	CONST. PERIOD FROM TO	COMMENTS
				PEAK FORCE	MAN YEARS			
Consolidated Bathurst	Modernize & Expand	Trois Rivières Shawinigan Grande Mer	155				1980 - 82	
Domtar	Modernize & Expand	Label sur Quevillon Donnacona	135				1981/82-1986/87	
Donahue Normick Inc.	Newsprint Mill	Amos	190				1980 - 82	145 kt/yr
Renfor/Soucy	Newsprint		230			430		450 t/d
Various	Modernize & Expand	Various	500 +				1981 - 90	Pulp and paper

**Table F-19 Province Quebec**  
**Sector Primary Metals Production**

OWNER/SPONSOR	PROJECT	LOCATION	ESTIMATED CAPITAL COST (\$ MILLIONS)	CONST. MANPOWER		OPERATING MANPOWER	CONST. PERIOD FROM TO	COMMENTS
				PEAK FORCE	MAN YEARS			
Alcan	Aluminum Smelter	Grande Baie	500				1980 - 82	1.0 Mtpa
Canadian Reynolds Aluminum	Aluminum Smelter Expansion - Phase II	Baie Comeau	100				1980 -	
Unknown	Port and Aluminum Smelter	Saguenay Region	700				1981 - 86	Port - \$300 million, Smelter - \$400 million

**Table F-20 Province Quebec**  
**Sector Transportation**

OWNER/SPONSOR	PROJECT	LOCATION	ESTIMATED CAPITAL COST (\$ MILLIONS)	CONST. MANPOWER		OPERATING MANPOWER	CONST. PERIOD FROM TO	COMMENTS
				PEAK FORCE	MAN YEARS			
Gov't of Canada	Gros Cacouna Port	Gros Cacouna	415				1981 - 95	
Ministry of Transport	Mirabel Phase II		300				1983 - 88	
National Harbours Board	Bulk Harbour Facilities	Montreal	300				1981 - 85	
Montreal Urban Community	Subway Line 5	Montreal	100				1982 -	
City of Quebec	LRT	Quebec	300(e)					
Gov't of Quebec/Gov't of Canada	Montreal Area Integrated Transport	Montreal Region	1 000				1980 - 85	Expand CN/CP commuter, subway (subway \$480 million + \$400 million, highways \$120 million)

**Table F-21 Province Quebec**  
**Sector Manufacturing**

OWNER/SPONSOR	PROJECT	LOCATION	ESTIMATED CAPITAL COST (\$ MILLIONS)	CONST. MANPOWER		OPERATING MANPOWER	CONST. PERIOD FROM TO	COMMENTS
				PEAK FORCE	MAN YEARS			
Deutz Diesel	Diesel Engine Plant	Montreal	175					

**Table F-22 Province ONTARIO**  
**Sector Processing & Petrochemicals**

OWNER/SPONSOR	PROJECT	LOCATION	ESTIMATED CAPITAL COST (\$ MILLIONS)	CONST. MANPOWER		OPERATING MANPOWER	CONST. PERIOD FROM TO	COMMENTS
				PEAK FORCE	MAN YEARS			
Esso Chemical	Low Density Polyethylene	Sarnia	100				1981 - 83	135 kt/yr.
Mobil	Polypropylene		100				1984 - 87	
Petrostar Suncor	Residual Oil Upgrading	Sarnia	500				1983 - 85/86	72 x 10 <sup>6</sup> m <sup>3</sup> /d (2 separate projects <sup>2</sup> )
Polysar	Isobutylene/Butyl Rubber Expansion	Sarnia	180				- 82	
Unknown	Gas Cracker Expansion		105				1981 - 83	

**Table F-23 Province Ontario**  
**Sector Electric Generation & Transmission**

OWNER SPONSOR	PROJECT	LOCATION	ESTIMATED CAPITAL COST (\$ MILLIONS)	CONST. MANPOWER		OPERATING MANPOWER	CONST. PERIOD FROM TO	COMMENTS
				PEAK FORCE	MAN YEARS			
Gov't of Ontario	Waste Energy Projects (Biomass)	Various	3 200				1990 - 95	
Great Lakes Power	Power Gen. - Hydro	Sault Ste. Marie	100				1979 - 82	45 MW
Inco	Power Dam & Dist. - Hydro	St. Mary's River	170				1980 - 85	
Ontario Hydro	Mission Isl. Gen. Sta. - Thermal	Thunder Bay	430	700			1979 - 82	2 units: 300 MW
	Atikokan - Thermal	Marmion Lake	890				1979 - 88	400 MW
	Pickering B - Nuclear		2 230		9 135	450	1979 - 85	4 units: 2000 MW
	Bruce B - Nuclear	Port Elgin	3 400		12 000	600	1979 - 87	4 units: 3000 MW
	Darlington - Nuclear	Bowmanville	5 500		14 610	600	1979 - 91	4 units: 3500 MW
	Nuclear		6 000				1985 - 99	1 unit: 3400 MW
	Hydro		3 700				1987 - 98	7 units: 100-400 MW
	Transformer Station/Lines		11 813				1979 - 99	
	Lignite Thermal	Onakawana (240 km north of Timmins)	1 000				1986 - 92	Open pit mine & power

**Table F-24 Province Ontario**  
**Sector Forest Products**

OWNER/SPONSOR	PROJECT	LOCATION	ESTIMATED CAPITAL COST (\$ MILLIONS)	CONST. MANPOWER		OPERATING MANPOWER	CONST. PERIOD FROM TO	COMMENTS
				PEAK FORCE	MAN YEARS			
Abitibi Price	Pulp & Paper Modernization	Thunder Bay	700				1979 - 84	
Domtar	Modernize & Expand	Cornwall	120					
E.B. Eddy	Modernize & Expand	Espanola	250				1 80 85	
Great Lakes Forest Products	Modernize & Expand Pulp Mill	Dryden	345				1 80 85	
Ontario Paper	Modernization	Thorold	260				1980 - 85	

**Table F-25 Province Ontario**  
**Sector Mining**

OWNER SPONSOR	PROJECT	LOCATION	ESTIMATED CAPITAL COST (\$ MILLIONS)	CONST. MANPOWER		OPERATING MANPOWER	CONST. PERIOD FROM TO	COMMENTS
				PEAK FORCE	MAN YEARS			
AECL	Plutonium Extraction Plant		1 500				1983 - 85	
Algoma	Iron Ore Development	Lake St. Joseph Area	1 200	1 600		725	1988 - 99	3.6 Mt/yr. gross pellets (first phase = \$520 million)
Denison Mines	Expand Mine & Mill (Uranium)	Elliot Lake	200				1978 - 85	Expansion to 10.9 kt/d ore
Eldorado Nuclear	Uranium Refinery	Blind River	190				1979 - 81	
Falconbridge	Fraser Nickel/Copper Mine	Sudbury	125				1979 - 81	
Preston Mines Ltd	Rehab. Stanleigh Uranium Mine & Mill	Elliot Lake	200(e)			1 000		4.5 kt/d ore
Rio Algom Mines	Expansions & Rehabilitation (Uranium)	Elliot Lake	385				1978 - 84	
Texas Gulf	New Copper Smelter	Kid Creek	500				1979 - 81	

**Table F-26 Province Ontario**  
**Sector Primary Metals Production**

OWNER SPONSOR	PROJECT	LOCATION	ESTIMATED CAPITAL COST (\$ MILLIONS)	CONST. MANPOWER		OPERATING MANPOWER	CONST. PERIOD FROM TO	COMMENTS
				PEAK FORCE	MAN YEARS			
Algoma Steel	Seamless Tube Plant Exp. Finishing Facilities	Sault Ste. Marie	300 200	500		500	1979 - 84 - 90	180 kt/yr. 90 kt/yr.
Atlas Steel	Steel Plant Expansion	Welland	100				1981 - 84	
Dofasco	Hot Strip Mill	Hamilton	450				1980 - 83	1.1 Mt/yr.
Stelco	Steel Mill Expansion	Nanticoke	360				1979 - 84	

**Table F-27 Province Ontario**  
**Sector Manufacturing**

OWNER SPONSOR	PROJECT	LOCATION	ESTIMATED CAPITAL COST (\$ MILLIONS)	CONST. MANPOWER		OPERATING MANPOWER	CONST. PERIOD FROM TO	COMMENTS
				PEAK FORCE	MAN YEARS			
Canadair	Challenger Extension		100(e)					
Chrysler	Plant Conversion & Expansion	Windsor	1 000				1980 - 85	
De Havilland	Dash 8 Plant Facilities	Toronto	150			3 000	1981 - 85	
Ford	Engine Plant - V6	Windsor	580			3 100	1979 - 81	638 000 units/yr
General Motors Ltd	Automatic Transmission Plant Engine Plant	Windsor St. Catharines	1 000(e) 1 000(e)					
	Plant Conversion - Axles to Transmissions	St. Catharines	250				1980 - 82	

**Table F-28 Province Ontario**  
**Sector Transportation**

OWNER/SPONSOR	PROJECT	LOCATION	ESTIMATED CAPITAL COST (\$ MILLIONS)	CONST. MANPOWER		OPERATING MANPOWER	CONST. PERIOD FROM TO	COMMENTS
				PEAK FORCE	MAN YEARS			
National Capital Region (OTC)	LRT	Ottawa/Hull	400+					
Toronto Transit	Scarborough Line	Toronto	150				1981 - 90	

**Table F-29 Province MANITOBA**  
**Sector Electric Generation & Transmission**

OWNER/SPONSOR	PROJECT	LOCATION	ESTIMATED CAPITAL COST (\$ MILLIONS)	CONST. MANPOWER		OPERATING MANPOWER	CONST. PERIOD FROM TO	COMMENTS
				PEAK FORCE	MAN YEARS			
Manitoba Hydro	Wuskwatim-Hydro	Thompson River	540				1990 - 98	280 MW
	Conowapa G.S.-Hydro	Lower Nelson	2 095				1993 - 2002	1320 MW
	Limestone G.S.-Hydro	Ruru	1 540				1987 - 93	1 320 MW
	Manitou G.S.-Hydro		800				1990 - 98	110 MW
	First Rapids-Hydro		500				1995 - 2000	210 MW
	HVDC Conversion-Trans		480				1981 - 89	
	Burnt River Transmission							
	Complex		545				1990 - 2000	
	Winnipeg/Brandon-Trans		245				1985 - 95	500 kV
	Domestic Budget Dist & Transmission		1 185				1970 - 97	
			305				1990 - 97	

**Table F-30 Province Manitoba**  
**Sector Mining**

OWNER/SPONSOR	PROJECT	LOCATION	ESTIMATED CAPITAL COST (\$ MILLIONS)	CONST. MANPOWER		OPERATING MANPOWER	CONST. PERIOD FROM TO	COMMENTS
				PEAK FORCE	MAN YEARS			
International Minerals and Chemical Corp.	Potash Mine	St. Lazare	500			400+		1.8 Mtpa

**Table F-31 Province Manitoba**  
**Sector Primary Metals Production**

OWNER/SPONSOR	PROJECT	LOCATION	ESTIMATED CAPITAL COST (\$ MILLIONS)	CONST. MANPOWER		OPERATING MANPOWER	CONST. PERIOD FROM TO	COMMENTS
				PEAK FORCE	MAN YEARS			
Alcan	Aluminum Smelter		500			500+		

**Table F-32 Province SASKATCHEWAN**  
**Sector Heavy Oil Development**

OWNER/SPONSOR	PROJECT	LOCATION	ESTIMATED CAPITAL COST (\$ MILLIONS)	CONST. MANPOWER		OPERATING MANPOWER	CONST. PERIOD FROM TO	COMMENTS
				PEAK FORCE	MAN YEARS			
Husky	Enhanced Oil Recovery	Lloydminster	1 750			200	1980 - 2000	Includes work in Alberta

**Table F-33 Province Saskatchewan**  
Sector Processing & Petrochemicals

OWNER SPONSOR	PROJECT	LOCATION	ESTIMATED CAPITAL COST (\$ MILLIONS)	CONST. PEAK FORCE	MANPOWER MAN YEARS	OPERATING MANPOWER	CONST. PERIOD FROM TO	COMMENTS
Husky et al Ocelot/Potash Corp	Heavy Oil Upgrading Ammonia and Fertilizer	Lloydminster	1 000 500		3 500	200	1981 - 86	Minimum capacity of 4.8 x 10 <sup>3</sup> m <sup>3</sup> /d

**Table F-34 Province Saskatchewan**  
Sector Electric Generation & Transmission

OWNER SPONSOR	PROJECT	LOCATION	ESTIMATED CAPITAL COST (\$ MILLIONS)	CONST. PEAK FORCE	MANPOWER MAN YEARS	OPERATING MANPOWER	CONST. PERIOD FROM TO	COMMENTS
Sask. Power Corp.	Poplar R. #2 - Thermal	Coronach	170				1979 - 83	280 MW
	Nipawin - Hydro		315				1982 - 86	232 MW
	Steam #1 - lignite - Thermal		240				1985 - 89	280 MW
	Steam #2 - lignite - Thermal		270				1987 - 91	280 MW
	Thermal Station	Estevan	580				1989 - 94	
	Wintego - Hydro		645				1990 - 94	300 MW
	New Thermal #1		465				1992 - 96	465 MW
	Choceland - Hydro		675				1995 - 99	252 MW

**Table F-35 Province Saskatchewan**  
Sector Mining

OWNER SPONSOR	PROJECT	LOCATION	ESTIMATED CAPITAL COST (\$ MILLIONS)	CONST. MANPOWER		OPERATING MANPOWER	CONST. PERIOD FROM TO	COMMENTS
				PEAK FORCE	MAN YEARS			
Amok Ltd	Uranium Mine & Mill	Cluff Lake	165				1979 - 81	1.5 kt/yr. uranium
Canadian Occidental	Uranium Mine & Mill	McLean Lake	300(e)					
Eldorado Nuclear	Uranium Hexafluoride Plant	Warman	100	200-300				
Esso et al	Uranium Mine & Mill	Midwest Lake	500 +				1983 - 86	
KLMC (SMDC et al)	Uranium Mine & Mill	Key Lake	500	800		500	1981 - 83	5.4 kt/yr. uranium oxide
Potash Corp. of Saskatchewan	Mine Expansion	Lanigan Mine	450	700		250	1981 - 83	1.8 kt/month increase
	Other Expansions - Potash	Various	1 370				1979 - 89	Increase capacity
	Bredenbury Mine (New)	S.E. of Yorkton	600				1982 - 86	3.6 Mt/yr.

**Table F-36 Province ALBERTA**  
Sector Exploration & Development

OWNER SPONSOR	PROJECT	LOCATION	ESTIMATED CAPITAL COST (\$ MILLIONS)	CONST. MANPOWER		OPERATING MANPOWER	CONST. PERIOD FROM TO	COMMENTS
				PEAK FORCE	MAN YEARS			
Esso Resources Canada Ltd.	CO <sub>2</sub> Miscible Flood	Judy Creek - Swan Hills Area	500				1982 - 85 +	Project recently cancelled by sponsor
Gulf Canada	Gas Processing Plant	Hanlon Area	200				1981 - 83	6.8 x 10 <sup>6</sup> m <sup>3</sup> /d; Partec Lavalin

**Table F-37 Province Alberta**  
**Sector Heavy Oil Development**

OWNER/SPONSOR	PROJECT	LOCATION	ESTIMATED CAPITAL COST (\$ MILLIONS)	CONST. PEAK FORCE	MANPOWER MAN YEARS	OPERATING MANPOWER	CONST. PERIOD FROM TO	COMMENTS
Esso Resources Canada Ltd	Cold Lake In-Situ Oil Sands	Cold Lake	7 000	6 000	25 000	2 300	1981 - 89	22 x 10 <sup>3</sup> m <sup>3</sup> /d, Fluor/Cana/Delta/ SNC-FW/Lavalin
Gulf Canada	Sundalta Oil Sands Mining	Fort McMurray Region	10 000				1986 - 90	
Nova/Petro-Canada	Oil Sands Mining	Fort McMurray	10 000				1985 - 90	21-22 x 10 <sup>3</sup> m <sup>3</sup> /d
Shell Canada et al	Peace River In-Situ Alsands Project	Peace River Fort McMurray	5 000 7 200	5 000 8 000	17 000	2 000 3 200	1985 - 92 1980 - 87	22 x 10 <sup>3</sup> m <sup>3</sup> /d; includes new town
Suncor	Oil Sands Plant Exp	Fort McMurray	185	750	100	275	- 81	2.1 x 10 <sup>3</sup> m <sup>3</sup> /d, Bechtel MHG/AESL
Syncrude	Plant Exp. - 3rd Train	Fort McMurray	1 500		8 000	1 000	1984 - 86	9.5 x 10 <sup>3</sup> m <sup>3</sup> /d; mining & upgrading
Unknown	Combustion Pilot Plant	Cold Lake	100				1985 - 87	

**Table F-38 Province Alberta**  
**Sector Processing & Petrochemicals**

OWNER/SPONSOR	PROJECT	LOCATION	ESTIMATED CAPITAL COST (\$ MILLIONS)	CONST. PEAK FORCE	MANPOWER MAN YEARS	OPERATING MANPOWER	CONST. PERIOD FROM TO	COMMENTS
Alberta Energy Co	Synthetic Nat. Gas Plant	Bruderheim	130	600			- 82	1.6 x 10 <sup>3</sup> m <sup>3</sup> /yr SNG
Alberta Energy/DuPont	Linear Polyethylene Plant	Edmonton Area	200				1981 - 84	227 kt/yr
Alberta Energy/Esso	Benzene Plant	13 km N.E. of Fort Sask	225			20	1981 - 84	500 kt/yr
Alberta Energy/Esso Chemical (Petalta)	Ethylbenzene/Styrene Plant	Bruderheim	300	800		120	1981 - 84	400 kt/yr.
Alberta Gas Chemicals	Methanol Plant Expansion	Medicine Hat	150	400		100	1979 - 82	Expansion to 2.4 kt/d
Alberta Gas Ethylene	Ethylene II Ethylene III	Joffre Joffre	875 590	500 1 080	3 800	80 20	1981 - 83 1983 - 85	554 kt/yr 680 kt/yr
AOSTRA	Synth. Oil Upgrading Plant		200					
Canadian Fertilizer	Ammonia/Urea Plants		200				1980 - 83	
Celanese Canada Inc.	Methanol Plant	Edmonton	255				- 82	2.1 kt/d, EPC contractor - PBS
CIL Inc.	Polyethylene Plant Expansions	Edmonton	165				1980 - 84	Increase capacity from 35 kt/yr. to 175 kt/yr. in two phases
City of Medicine Hat	Coal Gasification Pilot Plant	Medicine Hat Region	200 +				1990s	Feasibility study - Fluor Canada
Dow Chemical	Vinyl Chloride Monomer Ethylene Glycol	Fort Sask Fort Sask	165 100				1979 - 81 1980 - 84	
Esso Chemical Canada	Ammonia/Urea Fert. Plant and Plant Expansion	Redwater	345				1980 - 82	Expansion to 660 kt/yr.; new production of 1.6 kt/yr. ammonia and 1.5 kt/yr. urea
Gulf Canada	Refinery Expansion	Edmonton	100				1980 - 83	Increase capacity by 6.4 x 10 <sup>3</sup> m <sup>3</sup> /d to 19.2 x 10 <sup>3</sup> m <sup>3</sup> /d

**Table F-38 Province Alberta**  
**(Cont.) Sector Processing & Petrochemicals**

OWNER SPONSOR	PROJECT	LOCATION	ESTIMATED CAPITAL COST (\$ MILLIONS)	CONST. MANPOWER		OPERATING MANPOWER	CONST. PERIOD FROM TO	COMMENTS
				PEAK FORCE	MAN YEARS			
Imperial Oil	Refinery Expansion	Edmonton	185				1981 - 84	Increase capacity by $7 \times 10^3 \text{ m}^3/\text{d}$ to $32 \times 10^3 \text{ m}^3/\text{d}$
Nova Shell	Solvent Plants	Notre Dame	100	450	600	120	- 84	300 kt/yr
	Linear Low Density Polyethylene Plant	Lethbridge	250		600	75	- 84	270 kt/yr
Petro-Canada	Heavy Oil Upgrading	Hardisty	800		5,000	500	1983 - 86	$16 \times 10^3 \text{ m}^3/\text{d}$
Shell	Benzene Refinery	Fort Saskatchewan	155			200	1981 - 84	Diesel & hydrocarbon byproducts
Shell Husky	Synthetic Oil Refinery	Fort Saskatchewan	420	2,000		200	1980 - 84	$8 \times 10^3 \text{ m}^3/\text{d}$
Sheritt Gordon	Nitrogen Fert. Plant	Fort Saskatchewan	205				1980 - 83	
Turbo Resources	Refinery	Balta	75				1980 - 82	$4.8 \times 10^3 \text{ m}^3/\text{d}$ ; under const.
Union Carbide	Ethylene Glycol Plant	Ponchaix	500				1981 - 84	225 kt/yr
Various with Fed./Prov. Gov't	Coal Gasification/Liquefaction Coal Petrochemicals		1,800 2,000		5,000	800	1988 - 94 1988 - 96	
Various	Styrene Derivatives		2,000					

**Table F-39 Province Alberta**  
**Sector Electric Generation & Transmission**

OWNER SPONSOR	PROJECT	LOCATION	ESTIMATED CAPITAL COST (\$ MILLIONS)	CONST. MANPOWER		OPERATING MANPOWER	CONST. PERIOD FROM TO	COMMENTS
				PEAK FORCE	MAN YEARS			
Alberta Power	Battle River #5 Thermal Nethercess Thermal	Forestburg Hanna	240 740			330	1979 - 82 1981 - 86	
Calgary Power	Sundance #2 Thermal Acrophus Thermal Acrophus Exp. Thermal Caribou River Thermal	Parkland	200 615 865 4,580				1979 - 81 1979 - 84 1983 - 87	750 MW, mine exp. to 10.9 Mt/yr. 750 MW 2250 MW
Edmonton Power	Genesee Thermal	65 km S.W. of Edmonton	1,505	800		240	1987 - 97	4 x 375 MW
Fording Coal	Thermal Power Plant		4,500					2000 MW; for power export to U.S.
General ownership not yet determined	Thermal Units Dunvegan Hydro Mountain Rapids Hydro Gen. & Trans. Gas Fired Turbine Peaking Contingent Project	Peace River Slave River	2,540 1,855 2,000(re) 580				1979 - 96 1984 - 93 1990s 1995 - 99	3 x 375 MW 1500 MW 1500 MW, 800 km DC transmission

**Table F-40 Province Alberta**  
**Sector Forest Products**

OWNER/SPONSOR	PROJECT	LOCATION	ESTIMATED CAPITAL COST (\$ MILLIONS)	CONST. MANPOWER		OPERATING MANPOWER	CONST. PERIOD FROM TO	COMMENTS
				PEAK FORCE	MAN YEARS			
B.C. Forest Products	Sawmill	Fox Creek	300			760	1981 - 85	
	Pulp & Paper Mill	Grande Cache	400				1980 - 85	

**Table F-41 Province Alberta**  
**Sector Mining**

OWNER/SPONSOR	PROJECT	LOCATION	ESTIMATED CAPITAL COST (\$ MILLIONS)	CONST. MANPOWER		OPERATING MANPOWER	CONST. PERIOD FROM TO	COMMENTS
				PEAK FORCE	MAN YEARS			
Cardinal River Coals	Hydraulic Coal Mine	South of Hinton	200(e)					
Consolidation Coal	Open Pit Coal Mine	Nordeg	150					2 Mt/yr.
Esso Resources	Open Pit Coal Mine	Judy Creek	545	175		50	1982 - 85	2.3 Mt/yr
Fording Coal	Open Pit Coal Mine	Red Deer (Shaughnessy)	1,500(e)					
Fording/Petro-Canada	Thermal Coal Mine	Lethbridge	100					1 Mt/yr
Gregg River Resources	Open Pit Met. Coal	Coal Branch	185			250-300	1982 - 85	1.6 Mt/yr.
Luscar	Thermal Mine Exp	Coal Valley	250(e)				1982 - 85	200-300 kt/yr
McIntyre Mines	Met. Coal Mine	Near Grande Cache	100(e)					
Petro-Canada	Kipp Underground Coal Mine	Near Lethbridge	200(e)			50	84	900 kt/yr
Petrofina	Thermal Coal Mine	Near Shaughnessy	150(e)					
Shell	Gleichen Mine	Gleichen	200(e)					
Union Oil/Rescon	Open Pit Coal Mine	Obed	400	200-300		50	1982 - 85	3 Mt/yr.
Unknown	Underground Coal Mine	Ram River	400(e)					500 kt/yr
Unknown	Underground Coal Mine	Grassy Mountain	400(e)					500 kt/yr.

**Table F-42 Province Alberta**  
**Sector Transportation**

OWNER/SPONSOR	PROJECT	LOCATION	ESTIMATED CAPITAL COST (\$ MILLIONS)	CONST. MANPOWER		OPERATING MANPOWER	CONST. PERIOD FROM TO	COMMENTS
				PEAK FORCE	MAN YEARS			
City of Edmonton	LRT - South East Leg	Edmonton	575				1982 - 85	
City of Calgary	LRT - MacLeod Trail	Calgary	180				1980 - 82	
	LRT - Northwest Leg	Calgary	100				1982	
Gov't of Alberta	High Speed Rail Link	Calgary-Edmonton	200					
Northern Alberta Railway	Railway Extension	Fort McMurray North	100					

**Table F-43 Province Alberta**  
**Sector Manufacturing**

OWNER/SPONSOR	PROJECT	LOCATION	ESTIMATED CAPITAL COST (\$ MILLIONS)	CONST. PEAK FORCE	MANPOWER MAN YEARS	OPERATING MANPOWER	CONST. PERIOD FROM TO	COMMENTS
Canada Cement	Cement Plant Expansion	Edmonton	150					

**Table F-44 Province BRITISH COLUMBIA**  
**Sector Exploration & Development**

OWNER/SPONSOR	PROJECT	LOCATION	ESTIMATED CAPITAL COST (\$ MILLIONS)	CONST. PEAK FORCE	MANPOWER MAN YEARS	OPERATING MANPOWER	CONST. PERIOD FROM TO	COMMENTS
Petro Canada	Sour Gas Plant	Fort St. John	250					

**Table F-45 Province British Columbia**  
**Sector Pipelines**

OWNER/SPONSOR	PROJECT	LOCATION	ESTIMATED CAPITAL COST (\$ MILLIONS)	CONST. PEAK FORCE	MANPOWER MAN YEARS	OPERATING MANPOWER	CONST. PERIOD FROM TO	COMMENTS
B.C. Hydro	Gas Pipeline to Vancouver Island and Gas Dist	From Mainland South of Vancouver to Vancouver Island	230					Direct costs only; 1980 dollars
Transmountain Pipe	Coal Slurry Pipeline		200					
Westcoast Transmission	Gas Transmission Sulphur Scrubbing Plant Pipeline Looping	Williams Lake to Comox Dawson Creek	185 125 150				- 83 1983 - 85	

**Table F-46 Province British Columbia**  
**Sector Processing & Petrochemicals**

OWNER/SPONSOR	PROJECT	LOCATION	ESTIMATED CAPITAL COST (\$ MILLIONS)	CONST. PEAK FORCE	MANPOWER MAN YEARS	OPERATING MANPOWER	CONST. PERIOD FROM TO	COMMENTS
B.C. Hydro	Coal Liquefaction	Hat Creek	5 000	20 000		2500-3500	1983 - 90	7.9 x 10 <sup>3</sup> m <sup>3</sup> /d
Dome Petroleum	LNG Plant		1 400				- 85	2.6 Mt/yr.
Dome/Westcoast/CanOxy/Mitsubishi	Ethylene and Two Derivative Plants	Fort St. John Region and Coast	2 000		~ 700	1 200	- 85	2.7 Mt/yr. ethylene production
Ocelot Industries Ltd.	Methanol Plant	Kitimat	140				1980 - 81	1.2 kt/d
Westcoast Transmission	Methanol Plant	Kitimat	175				1981 - 82	
Westcoast/Petrocan/Mitsui	LNG Plant		1 500				1982 - 85	
Unknown	Ammonia Plant	Northeast B.C.	200				1981 - 82	

**Table F-47 Province** British Columbia  
**Sector** Electric Generation & Transmission

OWNER SPONSOR	PROJECT	LOCATION	ESTIMATED CAPITAL COST (\$ MILLIONS)	CONST. MANPOWER		OPERATING MANPOWER	CONST. PERIOD FROM TO	COMMENTS
				PEAK FORCE	MAN YEARS			
B.C. Hydro	Thermal Plant	Hat Creek	3 340		5 000		1985 - 94	2000 MW
	Revelstoke-Hydro		1 200	3 500	11 000	80	1979 - 83	6 x 150 MW
	Site C Peace River Hydro	Fort St. John	1 095	2 800			1979 - 89	755 MW
	Ashcroft Fluidized Bed		145		800	200	1990	70 MW
	Coal Demo Plant							
	Geothermal Pilot Plant*		85				1990	
	Stikine Iskut Dev.-Hydro		5 505				1988 - 99	
	Liard-Hydro Gen. & Trans.		10 905				1990 - 99	
	MacGregor Diversion-Hydro		100				1981 - 86	
	East Kootenay-Thermal		1 500				1990 - 95	350 MW
	West Kootenay Dam-Hydro		250				1990 - 95	
	Murphy Creek-Hydro		665				1990 - 95	
	Transmission							
	Vancouver Island		1 085				1980 - 89	
	Interconnect		480					
	Vancouver Island Trans.		100				1979 - 85	2 lines, 500 kV
	Revelstoke-Hydro		1 095				1979 - 84	500 kV
	Seven Mile-Hydro		365				1979 - 85	6 x 450 MW
	Peace Canyon-Hydro		390				1979 - 82	4 x 175 MW
	Mica 5 & 6-Hydro		505				1979 - 82	4 x 175 MW
							1980 - 86	2 x 434 MW, 2610 MW plant total

\*Included on the basis of new technology.

**Table F-48 Province** British Columbia  
**Sector** Forest Products

OWNER SPONSOR	PROJECT	LOCATION	ESTIMATED CAPITAL COST (\$ MILLIONS)	CONST. MANPOWER		OPERATING MANPOWER	CONST. PERIOD FROM TO	COMMENTS
				PEAK FORCE	MAN YEARS			
B.C. Forest Products	Thermomechanical Pulp Mill and Sawmill	Hammond (Crofton)	185				1980 - 82	
Canadian Cellulose	Expand Bleached Kraft Mill	Castlegar	250-360				1981 - 84	
Crown Zellerbach	Expand Newsprint and Modernizations	Elk Falls	250	600			1979 - 81	
MacMillan Bloedel	5 Yr. Expansion Plywood Mill/Liner Board Plant Pulp & Paper Exp.	Port Alberni Port Alberni Port Alberni	1 500 220 165				1979 - 84	Or alternative project
Northwood Pulp	Kraft Pulp Mill	Prince George	500	550	10 000		1980 - 82	
Rayonier Canada	Wood Fibre Kraft Pulp	Squamish	400				1980 - 85	

**Table F-49 Province British Columbia**  
**Sector Mining**

OWNER SPONSOR	PROJECT	LOCATION	ESTIMATED CAPITAL COST (\$ MILLIONS)	CONST. MANPOWER		OPERATING MANPOWER	CONST. PERIOD FROM TO	COMMENTS
				PEAK FORCE	MAN YEARS			
Amax	Climax Moly. Mine	Kitsault	160				1975	
BP	Coal Mine	Sukunka - Northeast B.C.	400 +				- 82	
Cominco	Equipment Modernization Expansion	Kimberley/Trail	400	400			- 85	Approx. 135 design staff
	Mechanize Sullivan Mine	Trail Kimberley	325 500					
Denison	Quintette Coal		400				1980 - 89	3.6 Mt/yr
Elco Mining	Open Pit Coal	Elk River	500				1982 - 87	3.6 Mt/yr.
Esso	Molybdenum Mine	Trout Lake	200				1983 - 84	
	Copper/Zinc Mine	Kutcho Creek	180				1985 - 88	3.6 Mt/yr
Fording	Expand Elkford Coal		150					
Highmont Mining	Molybdenum	Highland Valley	125					
Kaiser	Sparwood Coal	Southeast B.C.	200				1980 - 83	
Lomex	Expand Copper/Moly.	Highland Valley	160				1980 - 81	
Petro-Canada	Monkman Pass Coal		500				1985 - 89	2.7 Mt/yr
Placer/Equity Silver	Houston Mine	Near Prince George	105				1979 - 81	
Rio Algom	Sage Creek Coal		400					2.7 Mt/yr.
Shell	Line Creek Coal	Near Fernie	180			1 500	1979 - 82	7.6 Mt/yr.
Teck Corp.	Highmont Copper Moly Bullmoose Coal Field	Near Kamloops Chetwynd	150 140	850			80 1979 - 83	23 kt/d 1.4 Mt/yr
Valley Copper		Highland Valley	400-500				1981 - 83	Approx. 100 kt/d copper, molybdenum & silver (125 kt/yr. copper; 3.3 kt/yr. moly; 48 x 10 <sup>6</sup> g/yr. silver)

**Table F-50 Province British Columbia**  
**Sector Primary Metals Production**

OWNER SPONSOR	PROJECT	LOCATION	ESTIMATED CAPITAL COST (\$ MILLIONS)	CONST. MANPOWER		OPERATING MANPOWER	CONST. PERIOD FROM TO	COMMENTS
				PEAK FORCE	MAN YEARS			
Alcan	Aluminum Smelter Exp. and Power Plant	Kemano	2 000				1980 - 95	

**Table F-51 Province** British Columbia  
**Sector** Transportation

OWNER/SPONSOR	PROJECT	LOCATION	ESTIMATED CAPITAL COST (\$ MILLIONS)	CONST. MANPOWER		OPERATING MANPOWER	CONST. PERIOD FROM TO	COMMENTS
				PEAK FORCE	MAN YEARS			
B.C. Dept. of Highways	Coquihalla Hwy	To Merritt	250				1979 - 85	
B.C. Railway	North East Coal Rail Ext	N E B C	485					
City of Vancouver	LRT Project	Vancouver	320					
Gov't of Canada/ Alberta Wheat Pool	Port/Terminal - Ridley Island	Prince Rupert	270				1982 - 84	Coal terminal \$70 million and grain terminal \$200 million
National Harbours Board	Roberts Bank Terminal	Vancouver	100				1980 - 82	
CNR	Rail Upgrading & Unit Trains (Coal)		160					
CPR	Beaver Connaught Tunnel Grade Improvements, etc	Mainline - Roger's Pass Area Various	100 200				1983 - 89	16 km

**Table F-52 Province** YUKON/NWT  
**Sector** Exploration & Development

OWNER/SPONSOR	PROJECT	LOCATION	ESTIMATED CAPITAL COST (\$ MILLIONS)	CONST. MANPOWER		OPERATING MANPOWER	CONST. PERIOD FROM TO	COMMENTS
				PEAK FORCE	MAN YEARS			
Dome Canmar	Oil Development-Offshore	Beaufort Sea	25 000				1982 - 92	
Dome	Beaufort Sea Gas	Beaufort Sea	23 000				1982 - 90	Exploration & development
Esso Resources	Beaufort Sea Expl & Dev. Taglu Gas Plant Norman Wells Expansion	Beaufort Sea Richards Island Norman Wells, NWT	300 2 000 400		1 000	300	1980 - 85 1990 - 95 1981 - 84	28 x 10 <sup>6</sup> m <sup>3</sup> /d 4 x 10 <sup>6</sup> m <sup>3</sup> /d
Gulf Canada	Parsons Lake Gas Plant	80 km from Inuvik	300				1985 - 90	8.5 x 10 <sup>6</sup> m <sup>3</sup> /d
Pan Arctic	Arctic Islands Gas Dev.	Arctic Islands	10 000				1990 - 96	
Shell Canada Resources	Niglingak Gas Plant	Mackenzie Delta	200				1985 - 90	4.2 x 10 <sup>6</sup> m <sup>3</sup> /d
Unknown	Offshore Oil & Gas Dev.	Eastern Arctic	2 000				1990 - 91	

**Table F-53 Province** Yukon/NWT  
**Sector** Pipelines

OWNER/SPONSOR	PROJECT	LOCATION	ESTIMATED CAPITAL COST (\$ MILLIONS)	CONST. MANPOWER		OPERATING MANPOWER	CONST. PERIOD FROM TO	COMMENTS
				PEAK FORCE	MAN YEARS			
Foothills Pipe Lines	Dempster Gas Lateral	Mackenzie Delta to Whitchose	2 475		6 000	130	1985 - 89	34 x 10 <sup>6</sup> m <sup>3</sup> /d; hook-up to Alaska Gas Pipeline

**Table F-54 Province Yukon/NWT**  
**Sector Electric Generation & Transmission**

OWNER/SPONSOR	PROJECT	LOCATION	ESTIMATED CAPITAL COST (\$ MILLIONS)	CONST. MANPOWER		OPERATING MANPOWER	CONST. PERIOD FROM TO	COMMENTS
				PEAK FORCE	MAN YEARS			
NCP	Ixe Fingers Hydro	Yukon River	100				1981 - 83	

**Table F-55 Province Yukon/NWT**  
**Sector Mining**

OWNER/SPONSOR	PROJECT	LOCATION	ESTIMATED CAPITAL COST (\$ MILLIONS)	CONST. MANPOWER		OPERATING MANPOWER	CONST. PERIOD FROM TO	COMMENTS
				PEAK FORCE	MAN YEARS			
Cominco	Anvik Lead, Zinc	Little Cornwalls	150				1980 - 82	725 kt/yr.; underway
Cyprus Anvil	Lead/Zinc/Silver	Faro, Yukon	240				1980 - 81	
International Utilities	Lupin Gold Mine	Contwoyto Lake, NWT	115				1980 - 82	320 kt/yr. (ore)
Hudson's Bay Oil & Gas	Lead, Zinc	Tom Claims, Yukon	250(e)					
	Lead, Zinc	Howard Pass, Yukon	250(e)					
	Lead, Zinc, Tungsten, Silver	McMillan Pass, Yukon	250(e)					
	Lead, Zinc, Silver, Tungsten	Jason, Yukon	250(e)					

**Table F-56 Province Yukon/NWT**  
**Sector Transportation**

OWNER/SPONSOR	PROJECT	LOCATION	ESTIMATED CAPITAL COST (\$ MILLIONS)	CONST. MANPOWER		OPERATING MANPOWER	CONST. PERIOD FROM TO	COMMENTS
				PEAK FORCE	MAN YEARS			
NTCL	Barge System Expansion	Mackenzie River System	150(e)					Support to Beaufort Sea development
White Pass & Yukon	Rail Expansion to Faro	Yukon Territory	180				1986 - 89	

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